

Our work in regulating the Scottish water industry:
The scope for capital investment efficiency

volume **5**

**WATER INDUSTRY
COMMISSIONER
FOR SCOTLAND**

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Foreword

Unfortunately, it has been necessary for me to delay until now the publication of this volume of my proposed methodology for the *Strategic Review of Charges 2006-10*. This was because no baseline had been defined for the capital programme that was funded in the last Strategic Review.

I now have such a defined programme. There are still some important issues outstanding; these relate to the extent of this programme that will remain undelivered at the start of the next regulatory control period. However, I am hopeful that these issues can be resolved in the next few weeks.

In this volume I explain in detail my proposed approach to assessing the scope for capital expenditure efficiency. I propose to draw largely on the approach used by Ofwat. Importantly, I have provided Scottish Water with detailed guidance for its second draft business plan on the information that I will require on the proposed capital programme. I plan to publish this capital programme so that customers and other stakeholders can understand the investment that is planned for their area. This is in line with our commitment to the Better Regulation Task Force principles of transparency, accountability, consistency, proportionality and targeting.

I have now had the opportunity to consider Scottish Water's first draft business plan in some detail. This plan suggests that a price increase of 5% in excess of inflation over the four-year regulatory control period is required. The plan also forecasts a total capital programme of over £2.4 billion. My review of the plan suggests that prices do not need to increase in real terms in the foreseeable future. There are two principal reasons why I believe that price increases can be held below the rate of inflation. The first is that Scottish Water's first draft business plan understates the scope for improvement in efficiency.

The second is the level of proposed capital expenditure. I have analysed the capital programmes of the companies south of the border and it is clear that the current *Quality and Standards II* investment programme is very large (larger indeed than that delivered by any similar sized company south of the border). Although Scottish Water has taken important steps to improve its understanding of its assets, such a significant increase in the capital programme for the next regulatory control period is likely to represent a major challenge.

Paradoxically, increasing the size of the capital programme may actually result in fewer outputs being delivered. This would not benefit customers, the environment or public health. My analysis shows that the companies south of the border have improved their efficiency considerably at a time when they have been required to deliver slightly smaller capital programmes.

I expect to receive Guidance from the Scottish Ministers in January 2005. This Guidance will outline their investment priorities after considering the response to the *Quality and Standards III* consultation. This Guidance will underpin my draft determination of the price caps that should apply to Scottish Water for the next regulatory control period.

My focus at this Strategic Review of Charges is to ensure that I establish a robust and transparent process and set prices that are no higher than necessary.

I appreciate the need to explain what my Office is doing, and that is why I am keen to facilitate debate about the challenges facing the water industry in Scotland and my proposals for the coming Review. It is important that this debate reflects the facts; it is also important for stakeholders to acknowledge that improvements can only come when we recognise the

challenges we face. I have arranged a number of stakeholder information days and would encourage all interested parties to use these opportunities to ask questions and to have their say. Their views will help to inform the *Strategic Review of Charges 2006-10* and we will take full account of representations that are made to us in setting an efficiency target for capital expenditure for Scottish Water.

A handwritten signature in black ink, appearing to read 'Alan D A Sutherland'.

Alan D A Sutherland

Water Industry Commissioner for Scotland

December 2004

Executive summary

Introduction

This volume describes how we propose to set the level of expenditure that should be allowed to Scottish Water to meet the investment priorities outlined in the Minister's Guidance at the *Strategic Review of Charges 2006-10*.

Unfortunately we have had to delay publication of this volume from September 2004 until now. We considered that it was not in customers' interests to publish our approach to assessing capital efficiency for the next regulatory control period until outstanding issues relating to the capital expenditure programme from the current regulatory control period had been resolved.

We welcome responses from stakeholders to the specific consultation questions that are set out at the end of each chapter, as well as any other comments they might wish to make. Responses should be sent to:

Katherine Russell
Water Industry Commissioner for Scotland
Ochil House
Springkerse Business Park
Stirling FK7 7XE

or by email to :
SRCmethodology@watercommissioner.co.uk

Responses should arrive by 17 January 2005. We recognise that the period for consultation is short. This is, however, a direct result of the difficulty that we have had, and continue to have, in defining the baseline investment programme for the current regulatory control period. We apologise for any inconvenience which the shorter consultation period may cause.

Capital expenditure in the Scottish water and wastewater industry

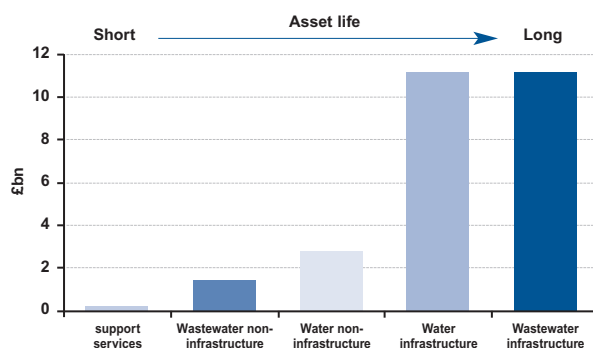
The assets required to deliver a water and wastewater service can be divided into five broad types:

- water infrastructure;
- water non-infrastructure;

- wastewater infrastructure;
- wastewater non-infrastructure; and
- support services.

Figure 1 illustrates the replacement cost and expected life of Scottish Water's assets.

Figure 1: Replacement cost and asset life by type of asset



Scottish Water is responsible for a larger geographic area than any of the water and wastewater companies in England and Wales. However, the asset bases either side of the border appear to have many similarities. This is illustrated in Table 1. The high proportion of the Scottish population that lives in the Central Belt and coastal communities may explain the possibly unexpected result.

Table 1: Comparison of the asset base

	Scottish Water	Ranking	Water and wastewater companies in England and Wales		
			Smallest	Mean	Largest
Length of water mains (km)	46,508	1st	11,226	27,706	45,674
Length of main per property (m)	18.74	5th	9.07	15.94	21.10
Length of sewers (km)	44,854	3rd	8,820	30,573	67,151
Length of sewer per property (m)*	13.34	7th	11.93	13.68	14.85
Number of water treatment works	371	1st	33	102	154
Number of wastewater treatment works**	616	4th	349	630	1,071

* Excludes lateral sewers as they are not part of the sewer network in England and Wales.

**Excludes 1,220 very small public septic tanks installations, which are uncommon in England and Wales.

Historic investment in Scotland

Investment in the water industry in Scotland began to increase significantly after the three former water authorities were established in 1996. This was delivered both by conventional procurement and by PFI.

The level of investment in England and Wales increased significantly after privatisation in 1989. By 1996-97, the privatised companies were investing some £3.5 billion per year.

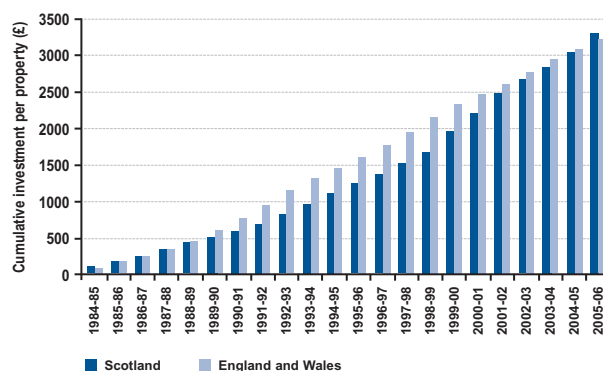
Investment in England and Wales has recently stabilised at around £3 billion a year. The *Strategic Review of Charges 2002-06* foresaw investment in Scotland stabilising at an average level of around £450 million each year.

We can compare the level of investment in Scotland with that in England and Wales using the measure of investment per property. Information about investment in Scotland is available for the years before 1996 from the capital account of local authority returns. This may actually understate the level of investment in Scotland as it will exclude any spending on assets from the revenue account.

Our analysis shows that investment per connected property in Scotland will have matched that in England and Wales over the period 1985-2006. Although investment in England and Wales was higher immediately after privatisation, the situation has reversed in recent years.

By the end of *Quality and Standards II*, the Scottish water industry is set to have invested more in cash terms for each connected property than was invested in England and Wales over a 10-year and a 20-year period.

Figure 2: Cumulative investment per property in Scotland and in England and Wales 1984 -2006¹



The conclusion from this analysis, therefore, is that if there is a significant backlog of investment in Scotland relative to that in England and Wales, it can only be a result of historical inefficiency, not a lack of investment funds. Customers in Scotland have paid for, and so deserve, an equivalent standard of service to that which customers in England and Wales receive.

Potential overhang from Quality and Standards II

It appears increasingly likely that the *Quality and Standards II* investment programme will not have been delivered in full by April 2006. The post-efficiency value of the programme is £1,808 million. Capital investment inflation is likely to increase the efficient cost of delivering this investment programme to approximately £1,930 million. Scottish Water has also been tasked with delivering a further £110 million of new outputs. This brings the total efficient cost of the investment programme for the current regulatory control period to around £2,040 million.

We have reviewed the quarterly Capital Investment Return that covers the period up to 30 September 2004. This review identified that a proportion of investment spending did not appear to relate to projects from the WIC18² baseline. To the end of September, Scottish Water had invested £961 million, of which £693 million related to projects identified as *Quality and Standards II*. There was no identified expenditure relating to the agreed new outputs.

¹ Adjusted for inflation and for the effect of PFI investment. Efficiency adjustment is not included. The forecast expenditure in Scotland for 2004-05 and 2005-06 is based on figures supplied by Scottish Water.

² WIC18 is a regulatory letter that was sent to the three authorities in May 2001. It asked for a detailed baseline for the *Quality and Standards II* investment programme of each authority.

In our agreement with Scottish Water, which determined how much spend-to-save should be included in the original investment programme, we agreed that £47 million of *Quality and Standards I* overhang inherited by Scottish Water could be included. This increased the identifiable baseline investment spending to £740 million.

The current regulatory control period ends in March 2006. This leaves 18 months before *Quality and Standards III* is due to start. If Scottish Water were able efficiently to spend £344 million in the remainder of the current financial year and £590 million in 2005-06, this would imply a total *Quality and Standards II* investment spending of £1,674 million.

We have analysed the small proportion of the programme that has been completed to beneficial use³ to date, and concluded that Scottish Water has delivered this element of the investment programme inefficiently. This inefficiency amounts to £10 million.

Our analysis suggests that a total of £1,664 million of *Quality and Standards II* outputs will have been delivered by the end of March 2006. This compares with a revised total investment programme of £2,040 million. Table 2 summarises the analysis.

Table 2: Analysis of likely Quality and Standards II overhang

Item	Quarterly Capital Investment Return analysis (£m)
<i>Quality and Standards II</i> spent to date (30/09/04)	693
Non-Quality and Standards II spent to date (30/09/04)	268
Total spending on investment	961
Check of Non-Quality and Standards II:	
Notified new outputs agreed (30/09/04)	0
Agreed <i>Quality and Standards I</i> carry-over into <i>Quality and Standards II</i> period (post-efficiency)	47
Total	47
Revised <i>Quality and Standards II</i> investment spending	740
Revised Non-Quality and Standards II	221
Total spending	961
Estimated maximum efficient investment spending for remainder of 2004-05	344
First half of 2004-05 investment spending	216
Total maximum estimated investment spending	560
Estimated maximum 2005-06 investment spending	590
Total expected <i>Quality and Standards II</i> investment spending (including new outputs)	1,674
Estimated inefficiency on completed projects	(10)
TOTAL EXPECTED QUALITY AND STANDARDS II OUTPUTS DELIVERED (INCLUDING NEW OUTPUTS) (a)	1,664
Baseline <i>Quality and Standards II</i> investment programme	1,810
Notified new outputs (WIC47)	110
Capital inflation above assumptions at Strategic Review of Charges	120
TOTAL REQUIRED INVESTMENT TO DELIVER OUTPUTS (b)	2,040
UNDELIVERED PORTION (b)-(a)	376

We outlined this analysis in our WIC51 letter to Scottish Water. Scottish Water has since substantially revised its regulatory return. Our review of the new information has not materially changed our view on the likely overhang. The revised information would imply that more of the money has been spent on *Quality and Standards II* projects. However, it appears likely that inefficiency or overhang from *Quality and Standards I* will have more than compensated for the extra money invested on *Quality and Standards II* projects.

We will continue to work with Scottish Water to understand the overhang from *Quality and Standards II* that will impact on the next regulatory control period. The output from this work will be a defined list of projects and status codes for the remainder of *Quality and Standards II*. This will need to be reconciled with the quarterly investment return for the period up to September 2004.

³ Beneficial use is the final stage of investment when outputs begin to be delivered.

If we are unable to agree the overhang with Scottish Water, we will use the information available from regulatory returns to set a baseline for the remainder of the current regulatory control period. We will only recognise spending as efficient if it appears on our baseline of projects.

The Minister's Guidance for the next regulatory control period is due at the end of January 2005. We will need to establish our baseline of the remaining *Quality and Standards II* projects if we have not been able to reach agreement with Scottish Water by 28 January 2005.

Investment programme deliverability

Our analysis suggests that there is a limit to the size of a capital programme that can be delivered efficiently. We have examined the capital programmes delivered south of the border and the improvement in capital efficiency that has been achieved in the past few years. We believe that there is a risk that having a capital programme that is too large could adversely impact on efficiency.

The *Quality and Standards II* investment programme was approximately £1.9⁴ billion over four years. This total investment is equivalent to £833 per household in Scotland.

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; Anglian Water and Yorkshire Water are similar in size to Scottish Water.

The following table compares the size of programmes delivered or defined by the companies with the *Quality and Standards II* programme.

Table 3: Summary of relative size of Quality and Standards II

	Largest four-year programme	Median four-year programme	Largest four-year programme per connected property
Thames	£2,200m	£1,992m	£540
Severn Trent	£2,773m	£2,078m	£782
United Utilities	£2,509m	£2,174m	£849
Anglian	£1,856m	£1,315m	£841
Yorkshire	£1,727m	£1,236m	£838
<i>Quality and Standards II</i>	£1,930m ⁵		£833

This shows that *Quality and Standards II* was a very large investment programme. It was larger than the largest programme ever delivered by Anglian Water and Yorkshire Water (the two companies of similar size to Scottish Water). It is also very large in terms of investment per connected property.

In its first draft business plan, Scottish Water proposed that it should deliver a *Quality and Standards III* investment programme of approximately £2.2 billion during the next regulatory control period. This was in addition to approximately £260 million of *Quality and Standards II* that would not have been spent. This would equate to a total investment programme of some £615 million per year, or £2.46 billion over the four-year regulatory control period. This is equivalent to more than £1,000 per connected property.

The extent of the challenge that Scottish Water sets itself in its first draft business plan is demonstrated in Table 4. This shows the frequency with which the five largest companies south of the border have delivered four-year investment programmes of more than £1.6 billion.

⁴ The original £1.81 billion investment programme included in the *Strategic Review of Charges 2002-06* increases to £1.93 billion as a result of higher than expected capital outputs inflation.

⁵ See footnote 1.

Table 4: Delivery of programmes of more than £1.6 billion

Size of four-year investment programme	Size of programme per year	Number of occasions	Cumulative %
Over £2.6 billion	£650m	2	2.4
Over £2.5 billion	£625m	4	4.7
Over £2.4 billion	£600m	6	7.1
Over £2.3 billion	£575m	11	12.9
Over £2.2 billion	£550m	15	17.6
Over £2.1 billion	£525m	23	27.1
Over £2.0 billion	£500m	29	34.1
Over £1.9 billion	£475m	41	48.2
Over £1.8 billion	£450m	44	51.8
Over £1.7 billion	£425m	48	56.5
Over £1.6 billion	£400m	54	63.5
Under £1.6 billion	£400m	31	100.0

This reveals that Scottish Water's proposed investment programme is almost without precedent in the recent history of the water and sewerage industry in the UK. The privatised companies have delivered programmes of more than £2.4 billion on only six occasions, or 7.1% of all of the possible four-year periods. None of these larger investment programmes has been delivered recently, nor was it as large as the proposed programme of Scottish Water on a per connected property basis.

How Ofwat assesses capital expenditure efficiency

The methods that Ofwat uses to assess capital expenditure efficiency for the companies south of the border have been developed over a number of years. Ofwat uses these methods as part of its price setting process. We have used Ofwat's methods to monitor Scottish Water's progress towards achieving the efficiency targets set in the *Strategic Review of Charges 2002-06*.

Capital maintenance econometrics

Ofwat's econometric modelling uses statistical regression analysis to establish a relationship between the costs incurred by companies and a defined set of cost drivers. These cost drivers have a significant impact on costs but are outside the control of the management of the company. By controlling the principal external cost drivers in the models, Ofwat can determine relative efficiency with a good degree of accuracy.

The cost drivers that are included within the econometric models are known as 'explanatory factors'. There are nine models and they take different forms. These are summarised in Table 5.

Table 5: 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 storage tower 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

We will use these models to assess the predicted level of capital maintenance for Scottish Water. This is an important benchmark and will ensure that customers receive value for money both in the short and in the longer term.

Capital works unit costs

We propose to use the Ofwat capital works unit costs, or 'cost base', approach to assess the relative efficiency of Scottish Water in procuring and implementing capital projects. Ofwat uses this technique to inform its assessment of relative efficiency for both capital maintenance and capital enhancement expenditure.

The cost base is a database of costs, termed 'standard costs', for a wide range of standardised projects, or units of work. We can compare the standard costs submitted by Scottish Water and the companies south of the border to assess relative procurement efficiency.

The cost base approach to assessing relative efficiency has been subject to detailed scrutiny by the Monopolies and Mergers Commission and by the Competition Commission. Both found the approach to be fit for purpose.

Ofwat reviews the submissions received from the companies in order to:

- ensure that the standard costs which are submitted comply with the specifications and guidance;
- ensure that the engineering judgement grades (EJG)⁶ have been correctly applied and interpreted;
- confirm that companies have derived their standard cost estimates independently;
- subject all submissions to an independent audit; and
- ensure comparability between companies.

In its 2004 price determination, Ofwat allowed only one company-specific factor – an adjustment for regional variations in construction, labour and tender costs. Ofwat has based its assessment of these adjustments on a study of the building and construction cost indices that was published by the Building Cost Information Service and the Department of Trade and Industry.

Ofwat uses the lowest reported cost as the benchmark standard cost, provided it complies with the following criteria:

- the standard cost used to derive the benchmark closely complied with the standard cost specification;
- at least 3% of the industry (measured in terms of turnover) reported unit costs at or below the benchmark standard cost;
- the standard cost was sufficiently robust to warrant an EJG of B3 or better;
- single company standard costs were generally used to derive the benchmark for items commonly procured from a single source over a range of sizes;
- the relevant benchmark is independently endorsed by consultants to Ofwat, Babbie Group.

Adjusting the Ofwat approach for Scotland

There may be factors that influence investment costs which are not adequately reflected in the analysis techniques that we have described above. Our assessment needs to take account of any relevant factors that are beyond management control but influence costs. We therefore ask Scottish Water, as part of its business plan submissions, to draw to our attention all factors that influence cost. This should include factors that both increase or decrease cost.

We want to ensure that our efficiency targets neither unduly penalise nor reward 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. They cite the following factors:

- Scotland's geography (size, remote islands, long coastline, topography.)
- Its population settlement patterns (remote communities and 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); and
- The short time that Scottish Water has had to mature and improve.

We propose to assess special factors for capital expenditure in the same way as we assess special

⁶ Engineering Judgement Grades - these are 'confidence' scores that are assigned to the information contained in the submission.

factors for operating expenditure. We will consider these and other factors carefully before determining the scope for capital efficiency.

In summary, Scottish Water has to provide evidence in the following areas to justify an adjustment to a special factor:

- What is the justification for the special factor? Scottish Water will need 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 wastewater 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 limit their impact?
- Are there other special factors that reduce costs? If so, have these been quantified and offset against the upward cost pressures?

The Scottish Executive's consultation: 'Investing in water services 2006-14'

Scottish Ministers will define the investment priorities for the water industry in Scotland. The Quality and Standards process identifies the priorities of customers, the quality regulators⁷ and other stakeholders. Ministers sought views on these issues in its consultation, 'Investing in water services 2006-14'.

Quality and Standards III will determine the investment priorities for the period 2006 to 2014. Our *Strategic Review of Charges 2006-10* will only cover the first half of this period.

Total investment is limited by the following factors:

- **Customers' bills:** customers ultimately pay for investment and higher investment will result in higher bills.

- **Ability to deliver the programme efficiently:** Scottish Water has a very large number of assets and individual investment projects tend to be relatively small. There is a limit to the size of investment programme that can be managed effectively by Scottish Water.
- **Capacity of the civil engineering market:** The civil engineering market in Scotland was recently estimated at £1.4 billion per year, with Scottish Water currently accounting for around one-third of this total.

It is important to be able to prioritise competing demands for investment. There will be demands to improve the levels of service to customers, to improve compliance with public health and environmental standards and to connect more properties to the water and sewerage network.

'Investing in water services 2006-14' sets out the Scottish Executive's views on the likely costs [based on Scottish Water's costing of the required investment] 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.

The consultation proposed the following principles:

- cost-effectiveness;
- affordability;
- deliverability; and
- sustainability;

Capital maintenance

Capital maintenance is important to the on-going effective management of the assets. Replacing assets in a timely way is essential to maximising the cost effectiveness of the network's performance and maintaining the level of service to customers.

⁷ The Scottish Environment Protection Agency (SEPA) and the Drinking Water Quality Regulator (DWQR).

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

Scottish Water estimated that maintaining current levels of service would cost around £275 million a year. Improving serviceability would cost around £340 million a year.

Growth investment

The consultation also sought views on investment in new development and first-time connections.

Estimates for business and housing developments vary. For example, it is estimated that between 120,000 and 230,000 houses will be built in the period 2006 to 2014. Scottish Water has estimated that the cost of connecting 230,000 houses to the public water and sewerage network is around £1 billion over the eight-year period. This cost will to some extent be met by a new charging regime for connections to the network⁸.

Improving the environment and public health

In recent years we have begun to invest significantly in improving the water environment. The consultation identifies that much remains to be done. There are more than 30 separate legal drivers for investment. Many of these drivers relate to European Union Directives.

Scottish Water has estimated that it will cost around £2.5 billion to meet mandatory standards. A further £500 million would be required to demonstrate progress towards the guideline standards.

It was also identified that significant investment was required to remove harmful substances, such as trihalomethanes and lead, from the water supply. Scottish Water has estimated that it needs to invest around £1.65 billion to reach the regulatory minimum position by 2010.

⁸ See Volume 3 of our methodology.

Improving customer service

The consultation identified three high priority customer issues. These are:

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

No estimates of the cost of dealing with odour are included in the consultation. Scottish Water estimated that it could substantially reduce the number of properties at risk of low pressure with an investment of £40 million. Scottish Water also suggested investment in reducing sewer flooding of £240 million.

The investments identified in the 'Investing in water services' consultation are summarised in Table 6.

Table 6: Summary of costs in 'Investing in water services' consultation

Description	Cost (£ million)
Maintenance	
Water	925
Waste water	1,300
'Higher standards'	500
Extending public networks	
Deep connections in new developments	500
First time water	200
First time waste water	600
Environmental improvements	
Legal minimum	2,500
Progress towards guideline	500
Drinking water and water resources	
Regulatory minimum	1,650
'Reasonable aspirations'	1,750
Other priorities for customers	
Odour	Unknown
Pressure	40
Sewer flooding	240
Total	10,705
Amount per annum (total divided by 8)	1,338

Lessons learnt from establishing the baseline investment programme for Quality and Standards II

One of the disappointments of *Quality and Standards II* has been the difficulties faced by both stakeholders and customers in monitoring Scottish Water's delivery of the investment programme. This has resulted from the lack of clearly defined projects and associated outputs that comprised the baseline programme.

Quality and Standards II defined the investment programme for the period April 2002 to March 2006. In May 2001 we wrote our WIC18 letter to the three authorities. This letter sought to establish a baseline for the investment programme of each authority.

We did not envisage that the authorities would find it difficult to provide the information we required, 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 relatively detailed investment programme. East of Scotland Water Authority, however, failed to provide the required level of detail. When Scottish Water was created in April 2002, this problem had still not been properly addressed.

A number of workshops were held in March 2003 where the key stakeholders examined the WIC18 programme lists, line by line, and allocated projects into two distinct categories. The 'red' category meant that the project was no longer required and was hence a candidate for replacement with an alternative project; while the 'green' category was for WIC18 projects that were still required.

The WIC18 experience has taught us that a fully defined capital investment programme must be in place at the outset of the next regulatory control period. Our discussions with the Scottish Environment Protection Agency (SEPA) and the Drinking Water Quality Regulator (DWQR) also lead us to conclude that the outputs to be delivered by each project must be clearly defined and quantified at the same time.

We propose that the baseline investment programme for *Quality and Standards III* should be published in full. This would help ensure transparency and accountability in the delivery of agreed benefits to customers and to the environment.

Defining the investment programme

Our requirement for a clear and detailed baseline for the *Quality and Standards III* investment plan is broadly consistent with those that are required by Ofwat for the companies south of the border.

The baseline is a key part of the regulatory contract between Scottish Water and its customers. The investment plan must be consistent with Ministerial Guidance⁹. This Guidance will set out the Scottish Executive's detailed investment priorities.

Scottish Water's proposed investment plan can be split into three main elements:

- capital maintenance;
- quality; and
- supply/demand.

The level of definition that is possible for each of these three elements varies. Some projects can be specified in advance, while others may be more reactive¹⁰. Capital maintenance projects tend to be more difficult to define than quality investment projects.

We will require a detailed list of all of the quality projects and supply/demand projects. The detailed list should also include all capital maintenance projects that have a value of more than £250,000.

Each investment project should have:

- a unique code;
- a unique name; and

⁹ Initial guidance was provided by the Minister for Environment and Rural Development, Ross Finnie MSP, in a letter to the Chairman of Scottish Water and the Water Industry Commissioner dated 26 May 2004. Further guidance is expected in January 2005.

¹⁰ Reactive projects are those associated with operational needs which arise at short notice; for example, replacing a piece of plant or section of pipe which has failed unexpectedly or where operational performance has declined over a short period of time.

- a geographical reference (place name and water supply zone/drainage area);
- a defined output.

All capital maintenance projects should identify clearly:

- the work proposed (its size, quantity and type);
- whether the project is planned or reactive;
- the cost; and
- an appropriate output measure.

The timetable for the delivery of projects should include:

- annual projected investment spend for each project – this should include any expenditure either before or after the regulatory control period;
- identification of key project milestones (for example when planning consent is granted); and
- the project's expected completion date.

We will require identical information for any overhang from *Quality and Standards II*.

Investment programme review

All regulators review the draft investment programmes that regulated companies provide. We propose to work closely with the Reporter, SEPA and the DWQR to review the investment programme proposed by Scottish Water. This is a first important step in ensuring that the proposed programme will meet the requirements of stakeholders and provide value for money for customers. It ensures that the scope of the proposals is appropriate to achieve the objectives set out by Ministers, and that the proposed expenditure is being effectively targeted.

It is important that we establish that the proposed programme will deliver the agreed outputs effectively. 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 obviously no

point in delivering an ineffective investment plan efficiently.

We propose to use the following criteria in our review of the investment programme:

- Is the programme sufficiently 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 DWQR, agree that the relevant quality objectives will be met by the proposed investment?
- Are there projects in the programme which do not contribute to the required objectives?
- 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 the projects in the programme been allocated measurable, defined outputs?
- 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 will provide us with an indication of areas where there is

scope to reduce or increase the outputs required from Scottish Water.

The output from the review should be a properly costed, fully defined list of capital investment projects, which, if delivered in full, will meet the objectives set out by Ministers for the regulatory control period.

How we propose to handle capital maintenance investment

It can be difficult to determine the correct level of expenditure on capital maintenance. Too much investment is likely to result in assets being replaced unnecessarily, leading to higher prices and little benefit for customers. Too little investment is likely to mean a gradual decline in performance and customer service.

Approach to capital maintenance in Quality and Standards II

During the *Quality and Standards II* process, an 'asset stewardship' approach was used to define the appropriate level of capital maintenance. This approach uses three key parameters to identify the required level of capital maintenance:

- condition;
- performance; and
- age.

Although the asset stewardship approach provides a reasonably sound engineering assessment of the state of the asset base, the approach has a number of weaknesses. Most notably:

- the gradings assigned for condition and performance are subjective and the approach to grading may vary between companies;
- the information which underpins the gradings and the assessment of remaining life may be of varying age and quality;
- there is no assessment of the level of service that the asset provides to customers; and

- there is no assessment of the risks associated with failure of the asset.

In addition, the approach tends to overestimate the requirement for capital maintenance. This is because it overlooks the operator's capacity to:

- rationalise the assets (by assessing whether or not it is still required);
- adopt strategic solutions, by reorganising the network in order to reduce or remove the asset;
- use new technology; and
- implement cost-effective operational solutions to defer replacement.

At the last Strategic Review of Charges, we accepted the capital maintenance requirement identified in *Quality and Standards II* but we applied an efficiency target to reflect the scope for strategic asset management efficiency.

The serviceability approach

In its 1994 and 1999 price reviews, Ofwat used a serviceability approach when assessing whether the level of capital maintenance investment by the companies was appropriate. This involved monitoring a set of defined asset and customer service performance indicators for each company. If these indicators were broadly constant, or marginally improving, then it was assumed that the historic level of capital maintenance spend was about right. If the indicators showed a decline in performance, this indicated that the company had historically been investing too little in capital maintenance.

At the last Strategic Review of Charges we were not able to use the serviceability approach because at that time we did not have sufficiently good quality information about asset performance and customer service levels.

The companies in England and Wales felt that the serviceability approach did not take sufficient account of the risk of asset failure in the future. Ofwat proposed a

collaborative approach to addressing these concerns. The industry commissioned UK Water Industry Research (UKWIR) to devise a more strategic, 'top-down' approach to assessing capital maintenance. The result was the 'Common framework for capital maintenance planning'.

Ofwat set out a four-stage approach – consistent with the UKWIR Common Framework Approach – to assess the companies' capital maintenance requirements in the 2005-10 regulatory control period. The four stages are as follows:

Stage A Maintaining serviceability to customers to date

This involves understanding past performance, trends from the serviceability indicators, and company actions necessary to address serviceability issues. This 'backward looking' assessment is mainly informed by the serviceability indicators.

Stage B Is the future period different?

This involves understanding what would be different about the next regulatory control period that would necessitate changes in the typical levels of activity that have been sufficient in the past. This element is informed by the company's assessment of its economic level of capital maintenance. This should be based on the UKWIR approach and should be both forward-looking and risk-based.

Stage C Scope for improvements in efficiency

This involves assessing the relative efficiency of each company in terms of its approach to capital maintenance and capital works, its capital/operating expenditure balance and the potential for each company to improve its efficiency over the next price review period. This uses Ofwat's established approaches for determining relative efficiency and assessing each company's scope for further efficiency improvements.

Stage D Impact of the enhancement programmes

This requires an understanding of the implications of each company's quality investment programme on the base capital maintenance programme. This is informed by an assessment of whether the quality programme defers or removes the requirement for capital maintenance expenditure.

Our proposed approach to capital maintenance in the Strategic Review of Charges 2006-10

In assessing Scottish Water's capital maintenance requirements in the *Strategic Review of Charges 2006-10*, we will take account of:

- Ministerial Guidance on the overall objectives of the investment programme;
- the capital maintenance requirement identified in the *Quality and Standards III* process;
- the capital maintenance requirement identified in Scottish Water's first and second draft business plans; and
- the Reporter's assessment of Scottish Water's capital maintenance proposals.

We will also review Ofwat's comments on the companies' plans for capital maintenance in its final determinations¹¹.

Our approach to assessing the requirement for capital maintenance can be divided into three stages:

Stage 1 Review capital maintenance spending and the condition and performance of the asset base

We will update our analysis of the historic levels of funding for the industry in Scotland and draw comparisons with England and Wales.

¹¹ *Future water and sewerage charges 2005-10* – Final determinations – December 2004.

Stage 2 Assess Scottish Water's capital maintenance proposals contained in its first and second draft business plans

We will analyse Scottish Water's capital maintenance proposals to establish:

- whether the proposals match the Ministerial Guidance;
- whether Scottish Water has followed best practice – we will analyse whether it has adopted techniques consistent with the UKWIR common framework approach and best practice asset management;
- the validity of assumptions underpinning Scottish Water's proposals;
- the accuracy of Scottish Water's costing process; and
- the extent of overlap between the capital maintenance proposals and other elements of the investment programme.

Stage 3 The scope for efficiency in delivering the capital maintenance programme

Our proposed methodology for determining the scope for efficiency in the delivery of capital maintenance will include the following stages:

- an assessment of the level of capital maintenance expenditure required by Scottish Water, given its current asset base. This assessment will be 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; and
- an assessment of the scope for efficiency. We propose to use the cost base approach to determine the scope for efficiency and draw on the evidence gathered by Ofwat on the scope for continuing improvement. We propose to use the scope for

efficiency either to adjust upwards the results of the econometric models or to reduce the cost of the capital maintenance programme proposed by Scottish Water in its second draft business plan.

How we propose to handle investment in improving the level of service

Investment in improving the water quality and environment has, in recent years, been the largest driver of capital investment in the water industry in Britain. This is likely to continue for the foreseeable future. Quality investment is usually targeted at one or more of the following:

- environmental improvements, such as additional treatment of wastewater;
- improved drinking water quality, such as a reduction in the number of samples contains harmful bacteria; and
- increased levels of service for customers, such as reduced levels of sewer flooding.

If customers are to receive value for money it is vital that this large quality investment programme is:

- properly defined;
- accurately costed; and
- effectively and efficiently delivered.

Our approach to Scottish Water's quality investment programme

In assessing Scottish Water's quality investment proposals in the *Strategic Review of Charges 2006-10* we will take account of:

- Ministerial Guidance on the overall objectives of the investment programme, with particular reference to quality objectives;
- the quality investment requirements identified in the *Quality and Standards III* process;

- the quality investment requirements identified in Scottish Water's initial and final business plan submissions; and
- the Reporter's assessment of Scottish Water's quality investment programme.

We will require a detailed investment plan which defines:

- the projects that comprise the programme, by asset;
- the outputs that each project will deliver;
- the expected costs for each project; and
- expected delivery dates.

Our business plan guidance specifies the format of this investment plan.

The Reporter's assessment of Scottish Water's quality investment proposals will form a key part of our analysis. We have provided detailed guidance to the Reporter on the particular areas we wish his audit of the quality programme to address. These include an assessment of:

- whether Scottish Water has provided a consistent interpretation of legal obligations and the Ministerial Guidance;
- whether Scottish Water has included all of the agreed requirements of the quality regulators – we have also asked the Reporter to comment on Scottish Water's challenge of quality obligations placed on it by the quality regulators as part of *Quality and Standards III*;
- how Scottish Water has interpreted the Water Framework Directive and other key legislation which impact significantly on costs;
- the design criteria used by Scottish Water and whether these are consistent with the criteria used to develop the standards;
- Scottish Water's costing process;

- whether the additional operating costs identified from the quality programme are additional, reasonable and have been applied consistently; and

- whether Scottish Water has costed the quality programme in an incremental way, taking full account of any optimisation and synergy benefits;

- cost estimates for defined projects.

We will also assess the scope for efficiency in delivering the quality programme. This assessment of the scope for efficiency will take place in two parts:

- an assessment of the current capital expenditure efficiency gap; and
- an assessment of the on-going scope for improvement in capital expenditure efficiency.

We will use the Ofwat cost base approach to determine the current gap in efficiency and will draw on the work undertaken by Ofwat to assess the scope for on-going improvement.

An overview of how we propose to set the appropriate level of capital expenditure to deliver the priorities outlined in the Minister's Guidance

We need to take account of a range of issues that will affect Scottish Water's ability to deliver its capital investment programme efficiently. These 'critical factors' are:

- the proportion of *Quality and Standards II* that will not have been delivered by March 2006;
- historical evidence on the size of investment programmes that are deliverable; and
- the incentive for Scottish Water to improve its performance.

Our overall approach is set out in Figure 3. This figure also highlights the appropriate chapter references in this volume.

Figure 3: Framework for capital investment targets

Establish investment programme	Chapters 1 to 8	Ministerial Guidance on the size of the overall investment programme and the outputs required to be delivered	
		Scottish Water Investment Plan submission with initial costs, project by project, and detailed information on outputs	
		Establish impact of <i>Quality and Standards II</i> overhang and build into baseline investment	
Review programme and establish a baseline	Chapters 9 and 10	Reporter & Regulator challenge: audit of scope of project solutions and costs	
		SEPA and DWQR scrutiny: ensure that required outputs are in the investment baseline	
Assess relative efficiency	Chapters 11 to 13	Ofwat capital maintenance econometrics and cost base	Ofwat cost base
Assess scope to improve	Chapter 14	Ofwat targets for capital maintenance and scope for outperformance by companies	Ofwat targets for capital enhancement and scope for outperformance by companies
	Chapter 8	Assess degree to which scope for improvement is limited by size of investment programme	Assess degree to which scope for improvement is limited by size of investment programme
Target expenditure and outputs	Chapter 15	Determine the required level of capital expenditure and the maximum outputs that can be delivered in accordance with Ministerial Guidance and within an overall level of investment spend that is consistent with efficient delivery	
Monitor progress	Chapter 16	Monitor the defined Project list: a baseline investment programme for 2006-07 to 2009-10, for capital maintenance and enhancements, including costs and outputs	
		Delivery monitored by stakeholders	

We propose to adopt a different approach to setting targets for capital efficiency in capital maintenance and in quality enhancement expenditure. However, in both cases, outperformance of targets will increase the resources that are available to add outputs to the baseline investment programme for the regulatory control period.

We set out our step-by-step process for each investment category below:

For both capital maintenance and capital enhancement

1. Establish a fully defined investment programme

Following Ministerial Guidance, Scottish Water will submit its investment plan in the agreed format for the second draft business plan. This format provides for a detailed list of projects and their associated outputs. It will also include a separate list that outlines in similar detail the proportion associated with *Quality and Standards II* projects that will not have been delivered by the end of March 2006. If we have been unable to reach agreement on the potential overhang by 28 January 2005 we will set an appropriate baseline.

2. Review the programme and establish a baseline

Scottish Water's investment plan will be scrutinised in detail by the Reporter, the quality regulators¹² and this office. We will determine whether the programme meets the objectives set out by Ministers. The output from this process will be a detailed baseline programme, which will list the projects required to deliver the investment requirements for capital maintenance and quality enhancement priorities.

For capital enhancement

3. Assess current efficiency gap

We will use Ofwat's cost base approach to determine the size of the procurement efficiency gap between Scottish Water and the companies in England and Wales.

4. Assess scope for further improvement

We will consider the scope for further improvement based on the targets set by Ofwat.

5. Establish the total allowable expenditure for capital enhancement

We will use the results of Steps 4 and 5 to establish the total allowable expenditure for quality

¹² SEPA and DWQR.

enhancement for each year of the next regulatory period.

For capital maintenance

3. Estimate the annual efficient level of expenditure for Scottish Water, consistent with the companies' recent performance

We will use the capital maintenance econometric models developed by Ofwat to estimate the cost of maintaining serviceability of the current asset base at average levels of efficiency.

4. Adjust the results to take account of special factors

We will consider any representations from Scottish Water that would justify additional funding for specific capital maintenance objectives.

5. Check the adjusted results of the econometric models

We will carry out a series of high-level comparisons to check that the adjusted results of the models do not underestimate Scottish Water's capital maintenance requirements.

6. Use the cost base approach to assess the current gap in capital expenditure efficiency

We will use the cost base approach described in Chapter 11 to determine Scottish Water's current capital efficiency position.

7. Assess the scope for further improvement

We propose to take account of Ofwat's expectations for improvement in capital efficiency when we set targets. Ofwat's has recently published its final determinations¹³ and we will draw on the evidence accepted by Ofwat to inform our analysis of the further scope for improvement. This will inform the targets that we set for each year.

8. Use the cost base results to set an appropriate level of capital maintenance spending

There are two ways in which we can use the results of the cost base analysis. Our approach will depend on the level of detail that Scottish Water is able to provide on its proposed capital maintenance investment programme.

If we consider that the programme is sufficiently detailed, we would propose to apply an efficiency target (calculated by analysis of the cost base) to the capital maintenance programme planned by Scottish Water.

If we conclude that the programme is insufficiently detailed, we would use the results of the cost base to increase the adjusted allowance for capital maintenance that is suggested by Ofwat's econometric models.

9. Set total level of capital expenditure and final baseline of projects with associated outputs

We will set a total allowance for capital expenditure and a detailed list of projects with associated outputs. This will be the baseline against which we would expect stakeholders and customers to monitor and judge Scottish Water's performance.

Questions for consultation

Chapter 2: The Scottish Executive's consultation: Investing in water services 2006-14

1. Do respondents agree that the final investment programme should be defined in detail at an asset level?
2. Do respondents agree that this investment programme should be placed in the public domain?

Chapter 3: Capital maintenance

3. Do respondents agree that the UKWIR common

¹³ *Future water and sewerage charges 2005-10* – Final determinations.

framework approach for capital maintenance provides a suitable mechanism for establishing Scottish Water's capital maintenance requirements.

4. Do respondents agree that our three-stage approach will allow us to establish whether Scottish Water's capital maintenance proposals are justified, well costed and meet best practice.

Chapter 4: Implications of the quality programme

5. Do respondents agree with our proposed approach to assessing Scottish Water's quality investment proposals?
6. Are there other factors that we should take into account to ensure customers receive value for money?

Chapter 5: Investment to balance supply/demand

7. Do respondents agree with our proposed framework for assessing Scottish Water's water resource and sewerage and sewage treatment planning?
8. Are there other factors that we should take into account to ensure customers receive value for money?

Chapter 6: Capital expenditure in the Scottish water and wastewater industry

9. Do respondents think that the scope for improvement is different between capital maintenance and capital enhancement and between water and sewerage?

Chapter 7: Lessons learned from establishing the baseline investment programme for Quality and Standards II

10. Do respondents agree that, based on experience from *Quality and Standards II*, a baseline investment programme detailing, at a project level, the deliverables from Scottish Water's capital expenditure is an essential pre-requisite for the *Strategic Review of Charges 2006-10*?

11. Do respondents think the investment programme should be published? If so, should it be published in full or should regional lists be provided?

12. Do respondents agree that an 'early start' programme for *Quality and Standards III* is not appropriate unless appropriate definition of the *Quality and Standards II* and *III* programmes is available?

Chapter 8: Investment programme deliverability

13. How do respondents believe we should treat the potential overhang from *Quality and Standards II*?
14. Should we learn from this experience in setting the investment programme for the next regulatory control period?

15. What factors should we take into account in establishing the deliverability of the investment programme?

16. Should we adjust the efficiency target if the proposed investment programme is very large?

Chapter 9: Defining the investment programme

17. Is the proposed degree of definition for the baseline investment programme sufficient?

18. If not, what other information should be captured, and why?

19. Would respondents agree with the rationale given in this chapter for the extent of definition of the baseline investment programme? In particular, is the reporting burden on Scottish Water appropriate?

Chapter 10: Investment programme review

20. Do respondents agree with our proposed use of the Reporter to carry out the process of verifying Scottish Water's capital investment proposals? If not, which other party do you think should be used for this exercise and why?

21. Do respondents have comments on our proposed verification process?
22. Does it meet the needs of customers and stakeholders?
23. Are the proposed areas of assessment sufficient to ensure that the programme is deliverable, takes full account of potential synergies and will meet the objectives set out by Ministers?

Chapter 11: How Ofwat assesses capital expenditure efficiency

24. What are respondents' views on Ofwat's methods for assessing capital expenditure efficiency?
25. What other approaches to the assessment of the scope for capital efficiency would respondents suggest? How would these work?

Chapter 12: Other ways to assess capital expenditure efficiency

26. Are there any lessons that we should learn from the experience of other regulators?

Chapter 13: Our proposed approach to assessing capital investment efficiency

27. Do respondents agree that there are benefits in using Ofwat's benchmarking techniques to assess the scope for Scottish Water to improve its capital efficiency?
28. What are respondents views on our proposed use of Ofwat's econometric models and cost base technique as the basis for establishing an efficient level of capital maintenance spend for Scottish Water? In particular, do our proposed adjustments to the econometric models appear appropriate? Are there other factors we should take into account?
29. What are respondents views on our proposed of Cost Base as the basis for establishing an efficient level of capital enhancement spend?

30. Are our proposed mechanisms for taking account of 'special factors' appropriate?

Chapter 14: Scope for and pace for improvement

31. Do respondents agree with our proposed approach to establishing the scope for improvement in capital efficiency?
32. Do respondents consider that we should treat capital maintenance and capital enhancement expenditure separately?
33. Do respondents agree that our proposals for introducing an incentive mechanism for outperformance will be in the interests of customers and stakeholders? Does the proposed mechanism provide appropriate incentives for outperformance, and does it share the benefits fairly between Scottish Water and customers? If not, which other mechanism would be preferable?
34. Do respondents agree that any future failure to meet efficiency targets should be funded by grant-in-aid from the Scottish Executive?

Chapter 15: Setting targets for efficiency in capital expenditure

35. Do respondents think that our proposed methodology for setting targets is robust?
36. Do respondents agree that we should take account of the 'critical factors' we have listed (*Quality and Standards II* overhang, limitations on the size of the programme and incentives to outperform) in setting investment targets for Scottish Water? Are there are other factors that we should take into account?

Chapter 16: Monitoring capital delivery

37. Do respondents think that the scope for improvement is different between capital maintenance and capital enhancement and between water and sewerage?

Section 1: Chapter 1

Introduction

We are committed to the principles of the Better Regulation Task Force: transparency, accountability, proportionality, consistency and targeting. Our approach to the second full *Strategic Review of Charges*, which covers the period 2006-10, takes full account of these principles. It also responds to some of the concerns raised by stakeholders in the past four years.

Our programme of work was described in, *Our work in regulating the Scottish water industry: Setting out a clear framework for the Strategic Review of Charges* which was published in July. In that document we explained that we intended to publish a detailed description of our approach to the next *Strategic Review of Charges* in a number of volumes:

- Volume 1 (published on 21 July 2004) outlined our detailed workplan;
- Volume 2 (published on 16 August 2004) described the background and outlined some of the changes in the institutional framework that will impact on the next Review;
- Volume 3 (published on 22 September 2004) explained how we propose to calculate the prices that customers will pay during the next regulatory control period. In particular, it explained our proposal to switch to the regulatory capital value (RCV) method of price setting; and
- Volume 4 (published on 7 October 2004) explained our proposals for assessing the scope for improvement in operating expenditure efficiency and for setting targets in allowable operating expenditure. It also examined the role of incentives in the regulation of a public sector corporation.

We are keen to understand stakeholders' views about our proposals, and in Volumes 3 and 4 we set out a number of questions for consultation.

This current volume, Volume 5, describes our proposed method for assessing the scope of capital expenditure efficiency.

We had originally intended to include this subject as part of Volume 4. Unfortunately, there were a number of issues that were outstanding in defining the current *Quality and Standards II* capital programme. We therefore delayed publishing this part of our methodology until now. We considered that it was not in customers' interests to publish our approach to assessing capital efficiency for the next regulatory control period until outstanding issues relating to the capital expenditure programme from the current regulatory period had been resolved.

We welcome responses to the consultation questions that are set out at the end of each chapter. Responses should be sent to:

Katherine Russell
Water Industry Commissioner for Scotland
Ochil House
Springkerse Business Park
Stirling FK7 7XE

or by email to :

srcmethodology@watercommissioner.co.uk

Responses should arrive by 17 January 2005.

We recognise that the period for consultation is short. This is, however, a direct result of the difficulty that we have had, and continue to have in defining the baseline investment programme for the current regulatory period. We apologise for any inconvenience which the shorter consultation period may cause.

Volume 5 considers issues relating to capital expenditure. Significant concerns have been expressed by stakeholders about both the progress and the scope of the current investment programme. We share some of these concerns, but believe that improved definition of the capital programme before the next regulatory control period begins will reduce many of these concerns.

Structure of this volume

Volume 5 is presented in four sections.

Section 1 is an introduction to capital investment. It comprises five chapters. Chapter 2 outlines the *Quality and Standards III* process and our response to the

Scottish Executive's consultation '*Investing in water services 2006-14*'. Chapter 3 discusses capital maintenance. Capital maintenance is the investment that is required to maintain the current level of service. It reflects the normal wear and tear on assets. Chapter 4 discusses the implications of the quality programme. The quality programme covers investment in assets designed to improve public health or environmental compliance. Investment in such assets may have operating cost implications. Chapter 5 outlines issues arising from the supply and demand for water and sewerage services.

Section 2 reviews the issues that need to be addressed if we are to establish a robust baseline for the investment programme in Scotland. It also describes how we propose to draw lessons from *Quality and Standards II* in establishing a clear baseline for *Quality and Standards III*. This section contains five chapters. Chapter 6 outlines the history of capital investment in Scotland and draws comparisons with investment south of the border. Chapter 7 describes the lessons that should be learned from our monitoring of *Quality and Standards II*. Chapter 8 highlights that increasing the size of the capital programme may not lead to more outputs and may make the management of public expenditure more problematic. Chapter 9 describes how we propose to set a baseline against which we will monitor progress. Finally Chapter 10 discusses how we will review the capital programme to identify opportunities for synergy.

Section 3 describes in detail the process by which we compare the relative efficiency of Scottish Water in capital expenditure with that of the companies south of the border. There are three chapters in this section. Chapter 11 discusses the approach that the Office of Water Services (Ofwat) uses in assessing the scope for capital efficiency for the companies in England and Wales. In Chapter 12 we outline alternative approaches to the assessment of the scope for capital expenditure efficiency. Chapter 13 outlines our proposed approach.

Section 4 looks forward to the end of the next regulatory period. It considers what the relative performance of Scottish Water and of the companies south of the border is likely to be in 2010. The difference in relative performance will inform the efficiency targets that we set. There are three chapters in this section. In Chapter 14

we assess the scope for improvement in Scottish Water's capital expenditure efficiency. Chapter 15 explains how we will set targets. The final chapter, Chapter 16, discusses how we propose to monitor and report on Scottish Water's capital investment performance during the next regulatory control period.

Section 1: Chapter 2

The Scottish Executive's consultation: *Investing in water services 2006-14*

2.1 Introduction

This chapter explains the Quality and Standards process and our response to the Scottish Executive's consultation document about this process, *Investing in water services 2006-14*. The Quality and Standards process determines the type and level of investment in the Scottish water industry.

We begin by providing a short overview of the significant investment that is required to maintain the level of service provided to customers. We then briefly discuss the first two Quality and Standards processes and their outcomes. We go on to outline the Scottish Executive's current Quality and Standards consultation and our response to it. The chapter ends with a review of the potential implications of *Quality and Standards III* for customers' bills.

2.2 Why does Scottish Water need to invest?

Rain water may fall from the sky but its collection, treatment and transportation to customers incurs costs. The Scottish water industry has some 46,500 kilometres of water mains and 370 water treatment works.

Waste water must be collected and transported to a treatment works, where it can be treated such that it may be discharged back to the environment. This requires some 44,900 kilometres of sewers and 616 sewage treatment works.

Scottish Water must invest in its assets in order to maintain a water and waste water service. Such investment can be divided into three broad categories:

- maintenance,
- quality, and
- growth.

2.2.1 Maintenance

In its *2003-04 Annual Return*, Scottish Water stated that it would cost more than £27 billion to replace all of the public water and sewerage assets in Scotland. It is important that we maintain these assets appropriately. This will require considerable on-going investment. Maintenance investment includes all spending on assets that is required to maintain the current level of service. Accountants measure the rate at which assets wear out using depreciation. In Volume 3, Chapter 3, we explained that, in the water industry, depreciation is recognised in two ways:

- Non-infrastructure assets (normally those above ground); these assets are depreciated using standard accounting methods; and
- Infrastructure assets (generally those below ground); these assets are assumed to be required in perpetuity and an annual charge (calculated as the average expected spend over the next 15-20 years) is made to the income and expenditure account to recognise the costs of maintaining the serviceability of the infrastructure.

Maintenance investment is split into 'base' investment and 'infrastructure renewals'. We use the term base to describe the maintenance of non-infrastructure assets. The term infrastructure renewals refers to investment in the infrastructure.

Base investment is necessary to maintain defined levels of service to customers. The ongoing replacement of assets at the end of their useful lives is termed base investment. Base investment does not produce any improvement in the underlying average level of service.

Infrastructure renewals expenditure is investment required to maintain the infrastructure network in the same condition and at the same performance level. As with base investment, no improvement in the underlying average service results from infrastructure renewals.

Maintenance investment is also referred to as capital maintenance. We discuss capital maintenance further in Chapter 3.

2.2.2 Quality investment

We use the term 'quality' to describe any investment that improves the average standard of the existing asset base. Quality investment is usually required for one (or more) of the following reasons:

- to improve the environment;
- to increase the quality of drinking water, thereby improving public health; and
- to increase the level of service to customers.

An example of quality investment would be the addition of secondary treatment at a waste water treatment works that currently has only primary treatment. This will result in an improved quality of treated effluent for discharge to the environment.

We discuss quality investment more fully in Chapter 4.

2.2.3 Growth investment

Investment categorised as growth is required to meet an increased demand for services from new and/or existing customers. This can mean increasing the capacity of existing assets or constructing new assets. An example of growth investment would be connecting a rural area to the water or sewerage network for the first time.

2.3 How the Quality and Standards process has developed

It is important to be able to prioritise competing demands for investment. There will be demands to improve compliance with public health and environmental standards and to connect more properties to the water and sewerage network.

Total investment is limited by the following factors:

- **Customers' bills:** customers ultimately pay for investment and higher investment will result in higher bills;
- **Ability to deliver the programme efficiently:** Scottish Water has a very large number of assets and individual investment projects tend to be quite small. There is a limit to the size of investment programme that can be managed effectively by Scottish Water; and
- **Capacity of the civil engineering market:** The civil engineering market in Scotland was recently estimated at £1.4 billion per year, with Scottish Water currently accounting for around one-third of this total.

Quality and Standards II targeted record levels of investment in the Scottish water industry. Despite some £132 million being made available to meet development constraints, there have been claims that there was insufficient investment in growth.

2.3.1 2000-01: Quality and Standards I

The water authorities' investment priorities for 2000 and 2001 were contained in a Scottish Executive publication *Water Quality and Standards*, which was published in November 1999. This was the first time that the investment programme in the Scottish water industry had been formalised.

Quality and Standards I focused on the amount of money that needed to be spent in order to attain certain standards. There was less focus on the customer outputs that would be delivered by this investment programme. *Quality and Standards I* identified the following investment priorities.

Table 2.1 Quality and Standards I investment

	2000-01	2001-02	Total
Investment in drinking water	£185m	£235m	£420m
Investment in sewerage	£165m	£155m	£320m
Total	£350m	£390m	£740m

In our interim *Strategic Review of Charges*, we recommended an increase in the level of investment in capital maintenance. We advised Ministers that higher revenue caps would be required to allow a sustainable level of investment in ongoing maintenance of the water authorities' assets. Our analysis had suggested that *Quality and Standards I* did not fully recognise the extent of investment required simply to maintain the current level of service to customers.

Sarah Boyack, MSP, the then Minister for Transport and the Environment, modified our advice in order to limit increases in prices to customers. The revised revenue caps did, however, make an extra £150 million available for investment. This revised the total level of investment included in *Quality and Standards I* to £890 million.

In our *Investment and Asset Management Report 2002-03* we highlighted that the water authorities had invested £888 million between April 2000 and March 2002. It therefore appeared reasonable that all of the *Quality and Standards I* objectives should have been delivered in full. We also reported that, since *Quality and Standards I* targets had been set at a very high level, it was not possible to monitor the delivery of those targets.

The information provided by the *Quality and Standards I* process without doubt provided greater clarity than had been available previously. However, customers would have benefited further if clearer and more detailed information about specific investment projects, and their expected outcomes, had been available.

2.3.2 2002-06: Quality and Standards II

In January 2001, the Scottish Executive published a consultation document¹ setting out clear options for the water authorities' investment programmes during the *Quality and Standards II* period.

In the document, customers were asked for their views on the future investment priorities of the water authorities. In particular, the consultation raised the issue of the balance that should be taken between

meeting standards by adopting long-term measures (such as building new and improved plants) or by adopting more temporary measures (such as increasing operating costs and/or further 'patching up' existing treatment plants). The consultation clearly highlighted that the quick-fix method was cheaper in the short term but more costly in the long run. Customers' views were also sought about the speed with which underground assets should be replaced.

The consultation document presented three options:

- Minimum option: This met the legal standards set by regulations on water and sewage treatment. This option had low-cost solutions and did not tackle the state of fast deteriorating existing assets, such as treatment plants, water mains and sewers;
- Central option: This met the legal standards and allowed for some improvements to the assets, although only investing enough in the underground infrastructure to prevent further deterioration; or
- Enhanced option: This allowed substantial progress towards modernising all of the assets. It was also the only option that included significant separate resources for removing development constraints and first time water and sewerage connections.

There were 40 responses to the consultation paper. These were mainly from local authorities and environmental organisations. Despite the potential for lower charge levels under the minimum option, only 5% of respondents supported this option. 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 53% (including the three water authorities and the Water Industry

¹ Scottish Executive, *Water Quality and Standards 2002-06*, 2001.

Commissioner for Scotland) supported the central option.

The Scottish Executive concluded that the central option should be chosen. It recognised that there was a difficult balance to be struck between the impact on customer charges and the undoubted benefits of the enhanced option. The Scottish Executive therefore included in the central option additional investment to help ease constraints on new developments, and to allow first time sewerage provision in rural areas.

The investment programme was summarised in *Water Quality and Standards: Investment priorities for Scotland's water authorities 2002-06*, 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 all of the outputs, originally costed at £2.34 billion, could be delivered by Scottish Water for £1.81 billion. Ministers accepted our advice. Scottish Water is therefore required to deliver the full scope of *Quality and Standards II* for £1.81 billion.

The summary document provided a greater amount of information about expected outputs than had been outlined for *Quality and Standards I*. The outputs 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 area.

The document also contained general information about other expected outputs from the investment, including:

- 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.

However, there was insufficient detail about these outputs, or the inputs, to allow us to monitor progress in their delivery as part of the *Quality and Standards II* investment programme.

In May 2001², we asked the former authorities to provide a project-level breakdown of their *Quality and Standards II* investment plans. Substantially complete lists were provided by the former North of Scotland Water Authority and West of Scotland Water Authority.

The former East of Scotland Water Authority provided a summary list. 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 included in its costing of *Quality and Standards II*³.

The process of trying to clarify a full and detailed inventory of outputs, which became known as WIC18, has taken far longer than it should have done. Despite our working closely with the Drinking Water Quality Regulator (DWQR) and SEPA, Scottish Water appears to have been reluctant to provide a final version of the capital programme to be delivered during *Quality and Standards II*.

We believe that we now have a complete list of all of the projects to be delivered in *Quality and Standards II*. However, we are concerned about the length of time that this process took. It would have been much better for

² WIC18 Quality and Standards Final Output, issued by the Water Industry Commissioner for Scotland in May 2001 to the Chief Executives of the three former water authorities. It is reprinted in *Our work in regulating the Scottish water industry: Setting out a clear framework for the Strategic Review of Charges 2006-10*, Appendix 2, page 142.

³ *Quality and Standards II* is the investment programme for the period April 2002 to March 2006.

customers, and for the wider group of stakeholders, if greater clarity had been provided in advance of the start of *Quality and Standards II*. This would help ensure that stakeholders' expectations are met and that the delivery of the programme is monitored effectively.

We believe that the need for detailed definition of the baseline capital programme is a lesson that must be learned from both *Quality and Standards I* and *II*. We will return to this issue in Chapters 7 and 9.

2.4 Quality and Standards III

Quality and Standards III will determine the investment priorities for the period 2006 to 2014. Our *Strategic Review of Charges 2006-10* will only cover the first half of this period.

Scottish Ministers will issue detailed guidance to this Office and to Scottish Water in January 2005 on the issues to be taken into account in the development of the *Strategic Review of Charges 2006-10*. This guidance will determine the investment priorities for 2006-10. Ministers' decisions are being supported by a wide-ranging public consultation and independent research. *Investing in Water Services 2006-10 – The Quality and Standards III project: A consultation paper* was published in July 2004.

2.4.1 Stakeholder process for developing the Quality and Standards III consultation and investment programme

At the start of the *Quality and Standards III* process, the Scottish Executive established a project board comprising a number of stakeholders. The board has had overall responsibility for developing the options to be included in the *Quality and Standards III* consultation.

Stakeholders represented on the board were:

- Communities Scotland;
- Confederation of British Industry (Scotland);

- Convention of Scottish Local Authorities and local authorities;
- Drinking Water Quality Regulator;
- Historic Scotland;
- Homes for Scotland;
- Scottish Environment Protection Agency;
- Scottish Executive Departments;
- Scottish Federation of Housing Associations;
- Scottish National Heritage;
- Scottish Water;
- Water Customer Consultation Panels; and
- Water Industry Commissioner for Scotland.

Detailed definition of the required investment was delegated to a number of specialist groups, each of which was responsible for a 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 ranging from 'do nothing' to 'aspirational' improvement were designed. 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 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 interim reports have been 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.

2.4.2 Content of the Investing in Water Services consultation

Investing in Water Services 2006-14 sets out the Scottish Executive's views on the likely costs [based on Scottish Water's costing of the required investment] of different levels and types of investment. The consultation seeks views on investment priorities and on whether or not bills should rise to pay for each type of investment. The Scottish Executive will use responses to the consultation to determine Scottish Water's investment programme for the period from 2006 to 2014.

Principles

The consultation begins by identifying the following principles that should be applied when the Scottish Executive determines 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; and
- 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 invites stakeholders to comment on these principles.

Establishing future investment needs

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

The Executive lists the following questions which it expected the work package groups to address in order to ensure that investment is 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 period or 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 asks if these are the correct questions that each work package group should use to assess each individual investment option.

Maintaining the current level of service to customers

We described the importance of proper maintenance of the asset base earlier in this chapter. The *Investing in*

Water Services consultation outlines the different approaches to assessing the appropriate level of investment in maintenance and suggests that a 'serviceability' approach should be used.

The serviceability approach involves identifying levels of service to customers then costing how much it would cost to maintain this level of service over the period. We discuss this approach further in Chapter 3.

The measures used by the Scottish Executive in the *Investing in Water Services* consultation are shown in Tables 2.2 and 2.3.

Table 2.2: Waste water serviceability standards and costs

Waste water serviceability indicator	Description	Number as at 31/03/04
Number of properties flooded due to other causes	Flooding that is caused by a means other than overloaded sewers. Such 'other causes' are blockages, collapse or operational failures that prevent the sewer system from carrying sewage, and subsequently the sewage discharges to the surface uncontrolled.	366
Number of pollution incidents	Pollution incidents resulting from uncontrolled sewage discharges (flooding and overflows) from the sewer network to a watercourse or area that harm the environment, habitat or population.	555
Number of collapses per 1,000km	Structural collapse of a sewer that prevents it from carrying sewage. Partial collapses also occur which do not completely prevent the sewer from carrying sewage but may decrease performance.	56
Number of failing waste water treatment works (capital maintenance)	A waste water treatment works is deemed to be 'failing' if its discharge does not comply with the sanitary requirements (numerical limits for a number of biological and chemical parameters) set out in the discharge consent, according to a permitted number of exceedences for each parameter.	45
Total estimated maintenance costs (over the eight-year period)		£1,300 million

Table 2.3: Water serviceability standards and costs

Water serviceability indicator	Description	Number as at 31/03/04
Number of bursts per unit length	Structural failure of a water main that prevents it from carrying water or results in loss of pressure in the main. Quoted as the number of bursts per 1,000km of mains.	198.3
Number of unplanned interruptions exceeding 12 hours	Loss of supply to customers for greater than 12 hours, either as the result of a burst or through a failure of another infrastructure asset.	3,000
Number of properties on the low pressure register	The number of properties receiving pressure below the reference level.	14,942
Water Quality 1,000 Index	The Water Quality 1,000 index covers regulatory compliance at customers' taps with 10 drinking water parameters. These are total coliforms, faecal coliforms, colour, turbidity, pH, aluminium, iron, manganese, lead and trihalomethanes. The 1,000 Index is subject to refinement as an indicator because not all of these 10 parameters are related to capital maintenance.	985
Number of microbiological (coliform) failures at water treatment works	The coliform group of organisms is present in the gut of all warm-blooded animals and also widely distributed in the environment. Their presence in water that is leaving a water treatment works indicates a failure of the disinfection system.	85
Total estimated maintenance costs (over the eight-year period)		£920 million

The Executive cites cost estimates from Scottish Water, which suggest that maintaining these current standards will cost around £2.2 billion, or around £275 million per year. The Executive also includes an estimate that a further £500 million over eight years would result in improvements in these outputs.

The *Investing in Water Services* consultation invites stakeholders' views on the importance of maintaining serviceability levels during *Quality and Standards III*. The Executive also seeks views on which serviceability measures are most important; and, if it is 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 splits 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 some 230,000 new houses would be built.

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

Scottish Water has estimated the cost of connecting 230,000 houses to the public water and sewerage network at about £1 billion over the eight years. This cost will to some extent be met by a new charging regime for connections to the network. A new regime of connection charging is also being consulted upon separately in the *Paying for Water Services* consultation document. We discussed this consultation in Volume 3, Chapter 2 of our methodology.

The Scottish Executive indicates that it intends to include a provision within the investment programme to fund deep connection costs. It asks stakeholders to consider whether this should be paid for by higher charges or lower investment in other areas.

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 are deemed 'reasonable'.

Three of the work package groups (environmental, drinking water, and extending public water and sewerage networks) have examined this issue. They have identified that first-time water provision could cost some £200 million over the eight-year period and 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 examines environmental issues has identified £260 million of priority first-time provision that they believe would deliver important environmental benefits.

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

Environmental improvements

Investing in Water Services recognises 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 for investment. Many of these drivers relate to European Union Directives.

The consultation identifies that around £2.5 billion is required to ensure that Scottish Water meets mandatory standards. A further £500 million is required to demonstrate progress towards the guideline standards.

The Scottish Executive asks stakeholders what they believe the top environmental priorities should be. It additionally asks whether stakeholders believe 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 Drinking Water Quality Regulator) and legal standards (required by law).

Investing in Water Services suggests 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 seeks views on the priorities for investment in drinking water and water resources. It also

asks whether stakeholders believe 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 identifies three high priority customer issues. These are:

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

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 legislation⁴ 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 regime⁵.

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

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 *Quality and Standards II*. Scottish Water estimates that it could remove 13,365 properties

from this register at a cost of £40 million. The consultation seeks 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 is a relatively rare occurrence. However, when it does happen it is distressing and unpleasant for those customers affected. The consultation estimates that an extra £240 million would remove around 2,301 properties from the 'at risk' register⁶.

Summary

The costs contained in the *Investing in Water Services* consultation are summarised in Table 2.4.

Table 2.4: Summary of costs in Investing in Water Services consultation

Description	Cost (£ million)
Maintenance	
Water	925
Waste water	1,300
'Higher standards'	500
Extending public networks	
Deep connections in new developments	500
First time water	200
First time waste water	600
Environmental improvements	
Legal minimum	2,500
Progress towards guideline	500
Drinking water and water resources	
Regulatory minimum	1,650
'Reasonable aspirations'	1,750
Other priorities for customers	
Odour	Unknown
Pressure	40
Sewer flooding	240
Total	10,705
Amount per annum (total divided by 8)	1,338

⁴ The Environment Protection Act 1990.

⁵ The integrated Pollution Prevention and Control is European Directive 96/61/EC that was enacted into UK law with the Pollution Prevention and Control Act 1999.

⁶ 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.

2.4.3 Our response to the Investing in Water Services consultation

This section outlines our response to the *Investing in Water Services* consultation. Our response recognises that customers are not likely to agree fully on priorities and that our principal role is to ensure that customers receive the best sustainable value for money.

Principles

We agree with the four guiding principles outlined by the Scottish Executive for *Quality and Standards III*. Our main concern is that the investment programme is properly defined, the inputs and the outputs are measurable, and that the investment programme is placed in the public domain. We believe that this is 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 and Standards III* investment programme can be monitored effectively.

Establishing future investment needs

We are pleased that the Executive has identified important questions for further work to understand investment needs. Our view is that two further questions should be added:

- 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 are important as it may be necessary to prioritise projects in order to ensure that the programme is deliverable. Clear definition of the programme should reduce discussions about the content of the programme at a later date.

Maintaining service standards

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.

Maintaining the current level of serviceability would be appropriate.

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

In our response to the *Paying for Water Services* consultation 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 good knowledge about 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.

Investing in the environment, drinking water quality and water resources

It is possible that we may not be able to afford or deliver all of the desired investment requirements. In this case, we believe that Ministers will have to balance:

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

Customer preferences can be gleaned from market research and from responses to this consultation. It is important that Ministers listen carefully to these preferences. However, it is also important to recognise the expertise of the Drinking Water Quality Regulator and SEPA and their understanding of important public health and environmental compliance issues

It is not our role to comment on the level and type of quality investment. It is important that any such investment is clearly defined at an asset level and takes account of the capital maintenance investment.

Other priorities for customers

We believe 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.

2.5 Comparison with England and Wales

In England and Wales there are similar investment needs. However, the process for identifying investment priorities is somewhat different.

2.5.1 Business plans

In England and Wales the onus is on the company to develop its investment programme. A company is expected to consult with both the Environment Agency and the Drinking Water Inspectorate. A company's investment plan should also be supported by customer research which shows that customers both demand the investment and are willing to pay for it.

Each company's initial proposals are contained in draft business plans which are submitted to Ofwat. These plans then form the basis of discussions between the companies, Ofwat, the Environment Agency and the Drinking Water Inspectorate about appropriate types

and levels of investment. Ministers then issue advice to companies and Ofwat about the investment that will be required. This advice allows the companies to submit final business plans to Ofwat that contain detailed investment plans.

2.5.2 Ofwat's role

Having scrutinised the business plans very carefully, Ofwat will:

- decide whether the proposed investment is justified; and
- determine the scope for efficiency in the delivery of the outputs.

Ofwat use several processes to remove investment which it believes is not justified⁷. These processes involve removing projects and schemes that:

- do not constitute value for money;
- do not have specific outputs;
- can be deferred to a later period;
- do not have the support of the quality regulators; or
- are particularly expensive.

Once Ofwat has reduced the number and scope of projects to be delivered it assesses the scope for efficiency in the delivery of the capital investment. The efficient delivery of investment is included in price limits. It is important that *Quality and Standards III* delivers an output that is as robust as the business plans in England and Wales deliver. In particular, investment priorities included in *Quality and Standards III* must be:

- specific;
- sustainable;

⁷ Ofwat, *Future water and sewerage charges 2005-10: Final determinations*, page 192.

- cost-effective; and
- based on customer preferences and willingness to pay.

Even with a specific investment programme there will be a need to ensure that it is relevant and current throughout the eight year period. A transparent and accountable process for substituting projects must therefore be developed.

2.6 Questions for consultation

1. Do respondents agree that the final investment programme should be defined in detail at an asset level?
2. Do respondents agree that this investment programme should be placed in the public domain?

Section 1: Chapter 3

Capital maintenance

3.1 Introduction

In Chapter 2 we examined the three major components of an investment programme, namely: capital maintenance, quality enhancement and investment to meet future supply/demand requirements.

Investment in capital maintenance is a major element of Scottish Water's capital programme; replacing assets at the end of their lives is essential to maintaining performance of the network, and hence to maintaining levels of service to customers.

In the current four-year *Quality and Standards II* period, investment in capital maintenance represents more than 40% of the £1.8 billion total expenditure. It is essential that customers can be assured that this investment is being spent effectively.

In this chapter we outline various approaches to assessing capital maintenance requirements for the water and wastewater industries. We also examine the approaches taken in England and Wales, and our proposed approach at the *Strategic Review of Charges 2006-10*.

It can be difficult to determine the correct level of expenditure on capital maintenance. Too much investment is likely to result in assets being replaced unnecessarily, leading to higher prices and little benefit for customers. Too little investment is likely to mean a gradual decline in performance and customer service.

Even a relatively high level of spending on capital maintenance may not bring the desired benefits if the operator lacks sufficient asset information or management capability. Without these, it may be difficult to target and prioritise capital maintenance investment in an efficient way.

3.2 Assets lives and replacement costs

The assets required to deliver water and wastewater 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.
- Wastewater 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.
- Wastewater non-infrastructure – wastewater 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 stores¹.

Table 3.1 shows the average operational lives of assets in each of these categories.

Table 3.1: Average operational asset lives

Categories	Assets	Life (years)
Water infrastructure	Water mains, dams and reservoirs	60-100
Water non-infrastructure	Water treatment works, service reservoirs	30-50
	Other facilities, including valves, pumping stations	<15
Wastewater infrastructure	Sewers	80-120
Wastewater non-infrastructure	Water treatment works	30-50
	Other facilities, including valves, sewage pumping stations	<15
Support services	Offices, depots and stores	5-10
	Vehicles, IT	3-7

Clearly, infrastructure assets have significantly longer lives than non-infrastructure and support service assets. This has an impact on the capital maintenance requirements in these areas.

Although the table shows the average asset life within each category, it is important to note that asset lives vary

¹ *Investment and asset management report 2002-03*, page 12, Water Industry Commissioner for Scotland.

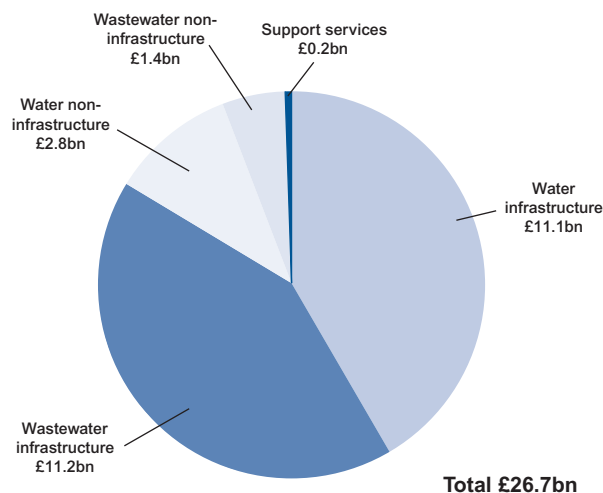
significantly within these categories. For example, many sewers that were installed during Victorian times still operate satisfactorily, while some that were laid more recently do not operate satisfactorily because of factors such as ground conditions or the use of sub-standard materials.

Scottish Water's assets currently include:²

- 371 water treatment works;
- 824 wastewater treatment works;
- 46,508 km of water mains; and
- 44,854 km of sewers.

It is estimated³ that it would cost approximately £27 billion for Scottish Water to replace its entire asset base. The replacement cost of different asset types is summarised in Figure 3.1.

Figure 3.1: Asset replacement cost



All assets have a finite life. Consequently an investment programme has to be of such a size that it will be able to replace, as required, all the assets that support the service to customers. The asset replacement cost is an indication of the investment that will be required over the very long term.

² Scottish Water Annual Return, June 2004, Table E.

³ Scottish Water Annual Return, June 2004, Table H.

⁴ See Chapter 4.

⁵ See Chapter 5.

3.3 Defining capital maintenance

Capital maintenance is the replacement of an asset that is at the end of its useful life. It relates solely to replacing assets to maintain the existing standard of customer service and/or environmental performance. As such, it is distinct from both investment in 'quality'⁴, which results in an increased level of service to customers or the environment, and expenditure on maintaining a balance between supply and demand⁵.

Capital maintenance that is undertaken on the below-ground infrastructure is termed 'infrastructure renewal' while that which is carried out on above-ground assets is 'base maintenance'.

Infrastructure renewal investment

Different parts of the network of water pipes and sewers wear out at different times and at different rates. The rate at which they deteriorate depends on factors such as age, soil type, construction and usage. The network is never replaced in its entirety; sections are renewed when their condition and performance deteriorates to a 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.

Infrastructure renewals investment maintains the underground infrastructure in the same condition and/or at the same overall performance level that exists today, on average. Performance of the network in different areas of the country may therefore improve or deteriorate.

Base maintenance

Above-ground assets, such as treatment works and pumping stations, are replaced when they reach the end of their lives. Base maintenance is defined as the investment required to replace these assets in such a way that the overall performance of the asset base remains constant.

When we use the term capital maintenance we mean the sum of infrastructure renewal and base maintenance expenditure.

Managing capital maintenance investment

As a water and sewerage company's asset base is large and diverse, it is able to adopt an ordered approach to replacing assets. Investment can be prioritised so that service is delivered to customers as effectively and efficiently as possible.

A useful example of capital maintenance funding is that of a typical water main. The average expected life of a water main is around 70-80 years, which is in line with average life expectancy. If an individual lived in the same house for the whole of their life, it would be reasonable to expect the water main supplying the property to be replaced once during that person's lifetime.

Customers contribute to charges during each year of their adult life. Some customers will pay in advance of receiving a new water main, others will receive the new water main earlier and will pay for it over the remainder of their life. In effect, the whole customer base jointly purchases each year a quantity of refurbished main that will keep the system in a fully serviceable order. Although as individuals they will benefit only once during their lifetime from the mains replacement, during all other years they will each have access to a safe water supply.

Although above-ground assets typically have shorter asset lives, the same logic applies. For example, if a water treatment works has an expected life of 40 years, a customer living in the same property for the whole of their life will see the water treatment works serving the property replaced twice during that time. Again, the average level of service received by the customer will not be affected by the actual timing of replacement.

The portfolio of Scottish Water's assets can be properly maintained by an annual sum of money, which, if consistently invested, will ensure that serviceability of the overall network is maintained.

3.4 Approach to capital maintenance in Quality and Standards II

Investment priorities for the Scottish water industry are established through the Quality and Standards process. In Chapter 2 we examined the Quality and Standards process. We also explained that we had worked hard to achieve great clarity concerning outputs for *Quality and Standards II* than there had been for *Quality and Standards I*.

In spite of our efforts, however, the outputs from capital maintenance expenditure were still not particularly well defined in *Quality and Standards II*. The outputs were limited to targets for water mains renewal and sewer refurbishment and to a statement that "the level of capital maintenance should meet the legal standards and make some improvement to the assets, although only investing enough in the underground infrastructure to prevent further deterioration"⁶.

In our 'WIC18' letter⁷, we outlined our requirement for a fully defined investment programme. Over the last several years we identified the list of projects that comprise the *Quality and Standards II* investment programme. This included more than 2,000 capital maintenance projects, representing investment of around £800 million. It will be important to build on this experience in the next regulatory control period.

Defining Quality and Standards II investment in capital maintenance

During the *Quality and Standards II* process, an 'asset stewardship' approach was used to define the appropriate level of capital maintenance. This approach uses three key parameters to identify the required level of capital maintenance:

- condition;
- performance; and
- age.

⁶ Scottish Executive, 'Water Quality & Standards – Investment Priorities for Scotland's Water Authorities 2002-2006', page 5.

⁷ WIC18 – *Quality and Standards Final Output* – 30 May 2001

In regulatory information returns, Scottish Water supplies us with information about each of these parameters for its asset base. Condition and performance grades are allocated on a scale of 1 to 5, using a clearly defined scoring system.

3.5 Our approach to assessing Scottish Water's capital maintenance requirements in the last Strategic Review of Charges

We developed 'renewal timing matrices' in order to reach conclusions about the assets' remaining lives and, hence, to determine the scope and phasing of the capital maintenance programme.

An example matrix is shown below. Both condition and performance are assessed on a scale of 1 to 5, with 1 being 'good' and 5 'failing'. The matrix indicates the asset's remaining life in years. As an example, an asset with a condition grade of 3 and a performance grade of 4 is estimated to have a remaining life of 4 years.

Table 3.3: Example renewal timing matrix

Example renewal timing matrix						
		Condition grade				
		1	2	3	4	5
Performance grade	1	60	50	40	30	7
	2	43	40	37	24	6
	3	22	19	14	9	2
	4	9	7	4	3	1
	5	4	3	2	1	0.5

Although the asset stewardship approach provides a reasonably sound engineering assessment of the state of the asset base, the approach has a number of weaknesses. Most notably:

- the gradings assigned for condition and performance are subjective and the approach to grading may vary between companies;
- the information which underpins the gradings and the assessment of remaining life may be of varying age and quality;
- there is no assessment of the level of service that the asset provides to customers; and

- there is no assessment of the risks associated with failure of the asset.

In addition, the approach tends to overestimate the requirement for capital maintenance. This is because it overlooks the operator's capacity to manage the assets in a strategic way.

Strategic asset management involves taking opportunities to:

- rationalise the assets (by assessing whether or not it is still required);
- adopt strategic solutions, by reorganising the network in order to reduce or remove the asset;
- use new technology; and
- implement cost-effective operational solutions to defer replacement.

Using strategic asset management when assessing the capital maintenance requirement will lead to a lower capital maintenance requirement than that which would be predicted using asset condition and performance grade analysis.

At the last Strategic Review of Charges, we accepted the capital maintenance requirement identified in *Quality and Standards II*. However, we also applied an efficiency target to it; this target included assessments of the scope for strategic asset management efficiency, and of opportunities for efficiency from improved procurement and innovation.

This approach was designed to allow the investment priorities established in *Quality and Standards II* to be delivered. We also highlighted the importance of improving Scottish Water's asset and customer service information.

3.6 Capital maintenance investment in England and Wales

In England and Wales, the reported level of capital maintenance expenditure in the period after privatisation

has remained relatively constant, at between 40% and 50% of total investment. Much of the investment in this period has been targeted at meeting EU directives on drinking water quality and environmental compliance.

Table 3.4: Capital investment in England and Wales

(2003-04 prices)	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04
Total investment (£ million)	3,073	3,752	4,154	4,031	3,958	2,897	3,077	3,508	3,662
Capital maintenance investment (£ million)	1,251	1,604	1,787	1,686	1,682	1,357	1,474	1,653	1,652
Percentage of total	40.7%	42.8%	43.0%	41.8%	42.5%	46.8%	47.9%	47.1%	45.1%

In the early years following privatisation, the companies' capital maintenance programmes were generally based on an asset stewardship approach.

The serviceability approach

In its 1994 and 1999 price reviews, Ofwat used a serviceability approach when assessing whether the level of capital maintenance investment by the companies was appropriate. This involved monitoring a set of defined asset and customer service performance indicators for each company. If these indicators were broadly constant, or marginally improving, then it was assumed that the historic level of capital maintenance spend was about right. If the indicators showed a decline in performance, this indicated that the company had historically been investing too little in capital maintenance.

Ofwat used serviceability as a measure of the asset performance of individual companies over time; not to compare one company with another.

The serviceability model monitors the following indicators.

Water infrastructure:

- the extent of low pressure problems;
- the number of mains bursts;

- the frequency and duration of interruptions to supplies; and
- quality compliance.

Water non-infrastructure:

- the number of water treatment works where enforcement action was considered because of contraventions of the coliforms standards; and
- the percentage of the total number of water samples containing coliforms taken at water treatment works.

Wastewater infrastructure:

- properties flooded because of insufficient sewer capacity;
- number of sewer collapses; and
- number of pollution incidents occurring at combined sewer overflows and sewers.

Wastewater non-infrastructure:

- number of sewage treatment works failing numeric consents; and
- the percentage of equivalent population served by non-compliant works failing look-up table consents.

At the last Strategic Review of Charges we were not able to use the serviceability approach because we did not have sufficiently good quality information about the assets. In particular, we did not have reliable information about asset performance and customer service levels. In their annual returns, the three former water authorities provided only limited information about the condition and performance grades of the assets.

Challenges to the serviceability approach

At the 1999 price review, a number of the companies in England and Wales asked for significant increases in the level of capital maintenance allowed. Ofwat determined that the level of capital maintenance did not need to increase because the serviceability indicators showed no material deterioration in levels of service to customers in the preceding five years.

Ofwat argued that the companies had not justified either the need for increases over the existing levels of expenditure or the economic rationale for increases. Ofwat commented further that “Age, condition and performance of individual assets are matters for the management of companies to consider in prioritising their capital maintenance programmes.”⁸

Two of the smaller water only companies, Sutton & East Surrey Water and Mid Kent Water, challenged Ofwat’s 1999 price determinations. Both argued that Ofwat had not allowed sufficient funding for capital maintenance. The cases were referred to the Competition Commission. It broadly supported Ofwat’s determinations for both companies. However, the Commission did criticise the serviceability approach. The Competition Commission’s final reports on the two referrals said:

- Whilst there is a logic to the Ofwat approach, it does not give the water companies confidence that serviceability to customers can be maintained without a risk of a significant backlog of expenditure occurring.
- Ofwat’s own surveys have shown that security of essential supply is one of customers’ main concerns. Although customers also want reduced prices, they do not want them at the risk of deteriorating security of supply.
- In this case, it is possible that the present Ofwat approach may risk reduced reliability of supply.⁹

Prior to the Competition Commission’s decision, Ofwat issued a letter, MD161¹⁰, to all of the water and sewerage companies and water only companies in England and Wales. The letter set out the information that Ofwat considered would need to be included in any case for increased capital maintenance. This information included:

- the cost of any potential loss of serviceability to customers, including consideration of risk scenarios

and their probabilities, as well as illustrations of how serviceability to customers would decline, if the activity was not undertaken;

- the impact of operating cost of capital maintenance activity, before and after assets are renewed;
- the circumstances surrounding the timing of asset replacement;
- the impact of obsolescence and new lower cost technology; and
- the underlying financial assumptions.

In MD161 Ofwat stated that there would need to be a greater understanding of the economic case for the levels of capital maintenance expenditure and that for the 2004 review it would need systematic information on all of the issues set out above.

The Competition Commission agreed with Ofwat’s view, as outlined in MD161, that there was a need for greater understanding about the relationship between serviceability and asset condition. It also stated that Ofwat should give more support to the companies’ efforts to research, develop, test and implement appropriate asset management systems.

Ofwat proposed a collaborative approach to addressing the concerns of the industry about capital maintenance. The industry commissioned UK Water Industry Research (UKWIR) to devise a more strategic, ‘top-down’ approach to assessing capital maintenance. The result was the ‘Common framework for capital maintenance planning’, which is discussed in more detail in section 3.8.

3.7 Ofwat’s approach to capital maintenance at the 2004 price review

Ofwat set out a four-stage approach to assess the companies’ capital maintenance requirements in the 2005-10 regulatory control period. The approach is

⁸ Ofwat, ‘Draft determinations: Future water and sewerage charges 2000-05’, page 98.

⁹ Competition Commission, ‘Mid Kent Water plc; A report under sections 12 and 14 of the Water Industry Act 1991 – Appendix 6.2 Historical capital maintenance and serviceability’, page 5.

¹⁰ Ofwat, MD161, ‘Maintaining serviceability to customers’, 12 April 2000.

broadly similar to that used in the 1999 review, but includes a forward-looking, risk-based methodology, consistent with the UKWIR common framework approach. The four stages are:

Stage A Maintaining serviceability to customers to date

This involves understanding past performance, trends from the serviceability indicators, and company actions necessary to address serviceability issues. This 'backward looking' assessment is mainly informed by the serviceability indicators.

Stage B Is the future period different?

This involves understanding what would be different about the next regulatory control period that would necessitate changes in the typical levels of activity that have been sufficient in the past. This element is informed by the company's assessment of its economic level of capital maintenance. This should be based on the UKWIR approach and should be both forward-looking and risk-based.

Stage C Scope for improvements in efficiency

This involves assessing the relative efficiency of each company in terms of its approach to capital maintenance and capital works, its capital/operating expenditure balance and the potential for each company to improve its efficiency over the next price review period. This uses Ofwat's established approaches for determining relative efficiency and assessing each company's scope for further efficiency improvements.

Stage D Impact of the enhancement programmes

This requires an understanding of the implications of each company's quality investment programme on the base capital maintenance programme. This is informed by an assessment of whether the quality programme defers or removes the requirement for capital maintenance expenditure.

While Ofwat recognises the potential difficulties that the companies might have in implementing the common framework approach fully, it believes that the approach will bring benefits in the long term.

In the next section we review the UKWIR approach in more detail before discussing the methodology we propose to employ in the *Strategic Review of Charges 2006-10*.

3.8 UKWIR common framework for capital maintenance planning

The UKWIR common framework for capital maintenance was developed with support from Ofwat, the Drinking Water Inspectorate, the Environment Agency, the Water Industry Commissioner for Scotland and the Department for Environment, Food and Rural Affairs. The UKWIR member Water Service Providers also participated actively¹¹.

Its aim is to provide a standard methodology for estimating the future requirement for capital maintenance. The framework provides a consistent approach to the assessment of the investment required to provide defined levels of service to customers and the environment. It is not a prescriptive methodology but a framework within which water and sewerage providers can develop their own approach to defining and prioritising capital maintenance investment.

The common framework represents a move away from the previous practice of using condition and performance grades to estimate remaining asset lives. It is based upon the principle of 'serviceability'. The overview to the common framework defines serviceability as the asset's "capability to provide service, which may not be the same as the actual service delivered. For example, a new treatment works which is being operated incorrectly may be 'serviceable', but is not providing 'service'."¹²

The common framework emphasises the importance of using both levels of service indicators (such as drinking water quality) and asset performance indicators (such

¹¹ UKWIR, 'Capital maintenance planning – A common framework, Volume 1: Overview', page (i).

¹² UKWIR, 'Capital maintenance planning – A common framework, Volume 1: Overview', page (iii).

as the number of sewer collapses) to understand the overall serviceability of the assets.

It also equates the risk of failure of an asset (via a risk index) with a corresponding level of capital maintenance expenditure. This allows the cost of ensuring that an asset can deliver a predetermined level of service to customers to be quantified.

The probability, consequence and cost of failure is quantified for each asset (using a combination of historical data and expert judgement). This analysis enables the impact on cost and levels of service of not undertaking proactive capital maintenance to be estimated. The consequence of failure is quantified in terms of its impact on the serviceability indicators.

The cost and impact of intervention (ie capital maintenance and/or operational changes) is also identified. The common framework approach therefore enables the costs of asset failure to be compared with the cost of the intervention. The impact of proactive capital maintenance expenditure can also be quantified in terms of the beneficial impact on levels of service to customers and the environment.

It is important to note that the common framework is specifically designed to provide sufficient flexibility to companies to allow for individual factors to be taken into account. It can also be implemented even if there are issues about the quantity and quality of asset and levels of service information.

We support the use of the common framework approach to capital maintenance. Throughout the *Quality and Standards III* process, we have encouraged Scottish Water to adopt the principles of the framework in developing its capital maintenance proposals. In the *Strategic Review of Charges 2006-10*, we will review Scottish Water's use of the common framework approach to establish its requirement for capital maintenance.

3.9 Our proposed approach to capital maintenance in the Strategic Review of Charges 2006-10

In assessing Scottish Water's capital maintenance requirements in the *Strategic Review of Charges 2006-10*, we will take account of:

- ministerial guidance on the overall objectives of the investment programme;
- the capital maintenance requirement identified in the *Quality and Standards III* process;
- the capital maintenance requirement identified in Scottish Water's first and second draft business plans; and
- the Reporter's assessment of Scottish Water's capital maintenance proposals.

We will also review Ofwat's comments on the companies' plans for capital maintenance in its final determination.

We will not be able to use Ofwat's serviceability approach because of the limited information available on assets and customer service. We will seek to ensure that regulatory returns are adapted to capture the information required for a serviceability model. This work will be completed in time for the *Strategic Review of Charges 2010-14*.

Our approach to assessing the requirement for capital maintenance can be divided into three stages:

Stage 1 Review of capital maintenance spending and the condition and performance of the asset base

We will update our analysis of the historic levels of funding for the industry in Scotland and draw comparisons with England and Wales. We will seek to establish whether funding levels in Scotland have historically been lower than south of the border.

We will also review our analysis of the condition and performance grades of the assets in Scotland. This will allow us to assess the level of capital maintenance that is required in Scotland.

Stage 2 An assessment of Scottish Water’s capital maintenance proposals contained in its first and second draft business plans

We will analyse Scottish Water’s capital maintenance proposals to establish:

- whether the proposals match the ministerial guidance;
- whether Scottish Water has followed best practice – we will analyse whether Scottish Water has adopted techniques consistent with the UKWIR common framework approach and best practice asset management;
- the validity of assumptions underpinning Scottish Water’s proposals;
- the accuracy of Scottish Water’s costing process; and
- the extent of overlap between the capital maintenance proposals and other elements of the investment programme.

We have provided the Reporter with detailed guidance covering the key issues on which we believe he should focus during his audit of Scottish Water’s first and second draft business plans.

We will scrutinise the investment programme carefully to ensure that the investment in drinking water quality, environmental improvement and improved customer service has been costed on an incremental basis. This approach is illustrated in Figure 3.2.

Figure 3.2: Incremental approach to investment costing



Capital maintenance is essential to maintaining the existing level of service to customers. It should therefore be the foundation of any investment programme. Statutory improvements to water quality and environmental performance should then be costed on an incremental basis. Such costing should take full account of any opportunity for optimisation and/or synergy with the capital maintenance programme.

This incremental approach will ensure that customers do not pay twice for the same output.

Stage 3 The scope for efficiency in delivery of the capital maintenance programme

Our proposed methodology for determining the scope for capital maintenance is discussed in detail in Chapter 13. In brief, it will include the following stages:

- an assessment of the level of capital maintenance expenditure required by Scottish Water, given its current asset base. This assessment will be 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; and
- an assessment of the scope for efficiency.

Our assessment of Scottish Water’s capital maintenance programme will seek to establish whether the proposals are based on robust information and best practice techniques.

If Scottish Water’s proposals are not based on robust information we would propose to limit capital maintenance expenditure to maintaining asset performance and customer service. Scottish Water would have to justify any additional capital maintenance expenditure on the basis of defined asset performance or customer service improvement.

3.10 Summary

Capital maintenance expenditure is a major component of Scottish Water's capital programme. This expenditure is essential to maintaining the performance of the network, through replacing assets at the end of their lives.

A range of techniques exist for establishing the appropriate level of capital maintenance expenditure. Best practice is defined in the UKWIR common framework for capital maintenance. An efficient and effective capital maintenance programme also relies on robust asset information and good asset management techniques.

In the *Strategic Review of Charges 2006-10*, we propose to allow a level of capital maintenance expenditure that provides sufficient investment to maintain the asset base in the long term and so ensure that present and future customers receive an acceptable level of service.

It is our belief that any capital investment above and beyond investment to maintain the asset base in the long term should be tied to measurable improvements in the service that is provided to customers or to other Quality and Standard priorities.

3.11 Questions for consultation

1. Do respondents agree that the UKWIR common framework approach for capital maintenance provides a suitable mechanism for establishing Scottish Water's capital maintenance requirements?
2. Do respondents agree that our three stage approach will allow us to establish whether Scottish Water's capital maintenance proposals are justified, well costed and meet best practice?

Section 1: Chapter 4

Implications of the quality programme

4.1 Introduction

In Chapter 2 we introduced the three major components of Scottish Water's capital investment programme: capital maintenance, quality enhancement and investment to meet future supply/demand requirements. In this chapter we discuss investment in quality enhancement.

Investment in improving the water quality and environment has, in recent years, been the largest driver of capital investment in the water industry in Britain. This is likely to continue for the foreseeable future. It is therefore essential to ensure that customers receive the benefit of this investment and that it represents good value for money.

In this chapter we examine the proposed investment in improving water quality and the environment. We look at the drivers of quality investment and discuss the recent levels of investment in quality enhancement both in Scotland and in England and Wales. We continue with a review of the proposed investment during the *Strategic Review of Charges 2006-10*. Finally, we discuss our proposed approach to reviewing Scottish Water's quality programme for 2006-10.

4.2 Importance of the quality programme for customers

As Chapter 2 explained, quality investment provides enhanced levels of customer service and environmental performance. This investment builds on the levels of service and performance delivered by capital maintenance investment. Quality investment is usually targeted at one or more of the following:

- environmental improvements, such as additional treatment of wastewater;
- improved drinking water quality, such as a reduction in the number of samples containing harmful bacteria; and

- increased levels of service for customers, such as reduced levels of sewer flooding.

Customer research¹ has highlighted the importance customers place on improving the environment and water quality. Legislative drivers, particularly from Europe, have also required investment to improve water quality and the environment. Investment in this category accounts for around 50% to 55% of total water industry investment in Scotland.

If customers are to receive value for money it is vital that this large quality investment programme is:

- properly defined – customers need to know which projects are being delivered and the environmental benefits, water quality improvements and/or customer service improvements that will result;
- accurately costed – if costs and benefits are to be properly assessed, accurate design and costing information is essential;
- effectively and efficiently delivered – this requires an assessment of the scope for efficiency and a rigorous approach to monitoring, including:
 - physical delivery of projects in the programme,
 - achievement of the required project output, and
 - Scottish Water's financial performance in delivering the project.

Each of these areas will be important in our assessment of the quality investment programme in the *Strategic Review of Charges 2006-10*.

4.3 Drivers of quality investment

The *Quality and Standards III* project defined the drivers for quality investment in the 2006-14 period. These drivers are listed in Annex B of the Scottish Executive's consultation on *Quality and Standards III 'Investing in water services 2006-14'*, published in July 2004².

¹ See, for example, MORI, Research into customer views, available at [http://www.ofwat.gov.uk/aprix/ofwat/publish.nsf/AttachmentsByTitle/mori_report_151102.pdf/\\$FILE/mori_report_151102.pdf](http://www.ofwat.gov.uk/aprix/ofwat/publish.nsf/AttachmentsByTitle/mori_report_151102.pdf/$FILE/mori_report_151102.pdf) and Scottish Executive Summary.

² Annex B covers environmental and drinking water drivers, which are classed as quality investment, and also water resource drivers, which would be categorised as supply/demand investment (as discussed in Chapter 5).

The consultation notes that compliance with prescribed standards for drinking water quality varies across Scotland and that particular issues exist in relation to compliance with the standards set for Lead and Trihalomethanes (by-products of the disinfection process). The Cryptosporidium (Scottish Water) Directions are an additional important driver (Cryptosporidium is a microscopic organism that can be harmful to humans).

The consultation describes the major environmental drivers: improving standards of wastewater treatment; protecting and improving the quality of bathing and shellfish waters; and protecting freshwater fish.

Customer service improvements are targeted at minimising the incidence of sewer flooding, increasing control of odour from wastewater treatment plants and reducing the number of properties that have insufficient water pressure.

The *Quality and Standards III* consultation document reveals that the majority of quality investment is required in order to comply with European legislation and national government policy.

European legislation

European legislation takes the form of Directives, which must then be incorporated into UK and Scots law.

Many pieces of European legislation have had an impact on the water industry in Scotland. Legislation passed from the mid-1970s to early 1980s mainly concerned water quality standards for rivers and lakes used for drinking water abstraction. Binding standards were set in 1980 for drinking water quality. Legislation was also passed that covered fish waters, shellfish waters, bathing waters and groundwaters.

Emissions were controlled through the Dangerous Substances Directive (1976). This was followed by more stringent regulations in the 1990s. These include the Urban Waste Water Treatment Directive (1991), the Integrated Pollution Prevention and Control Directive (1996) and the Drinking Water Directive (1998).

More recently, the Water Framework Directive (2000) will lead to a further increase in standards. This Directive encourages a more holistic approach to water management. It brings together existing legislation and tightens standards in other areas. The aim is to encourage more integrated water resource management, with greater stakeholder involvement. The *Quality and Standards III* consultation notes that considerable investment will be required to meet the objectives of the Water Framework Directive.

Under the Directive, EU countries must develop river basin management plans, through a stakeholder consultation process. These plans should set out in detail how the country will meet the mandatory standard of 'good' status for all waters.

Countries can derogate from some standards in certain situations, for example:

- where there are overriding policy objectives (such as flood prevention);
- where there are no technical alternatives;
- where they are prohibitively expensive; and
- where they produce a worse overall environmental result.

National government legislation

Some compliance targets are set through national (UK and/or Scottish) legislation. This is generally associated with situations where national policy is more stringent than that specified by European Directives.

An example of this is the Cryptosporidium (Scottish Water) Directions (2003). These directions seek to reduce the incidence of Cryptosporidium in drinking water. There are no specific provisions in European Directives in relation to Cryptosporidium and it is for individual countries to assess the risks and to establish their own legislation.

National policy and regulatory guidance

Scottish Water may face requests from regulators to achieve higher standards than are strictly required by law. These requests may be the result of local conditions or local policy. Such policy is subject to ministerial guidance.

It is important for the delivery of an efficient water and wastewater service that Scottish Water agrees the scope and timing of these obligations with the relevant regulators and government bodies. Investment to improve standards beyond the mandatory minimum can be incorporated at relatively low cost if the investment is timed to coincide with other capital maintenance or quality investment.

Compliance with all legislation and government policy is monitored by:

- the Scottish Environment Protection Agency (SEPA) – for the protection of the environment and water resource management; and
- the Drinking Water Quality Regulator (DWQR) – for water quality and public health.

SEPA and DWQR were key to the development of the required outputs for the quality investment programme.

Customer service improvement

Quality investment may also be required to improve the level of service provided to customers. This is recognised within the Scottish Executive's *Quality and Standards III* consultation '*Investing in water services 2006-14*'. It sets out 'other priorities for the customer' as including the following:

- Odour from wastewater treatment works

Traditionally, odour control has not represented a major driver for investment. However, in recent years, a variety of factors have led to increased customer concerns, including:

- increased awareness of public health issues;
- higher levels of wastewater treatment; and
- development of housing close to wastewater treatment works.

The measures required to reduce odour issues can vary from relatively simple operational measures, such as increased maintenance, to expensive investment in screening and air treatment.

- Sewer flooding

Although the incidence of sewer flooding is relatively rare, it is nonetheless unpleasant for those customers who have the misfortune to experience it. It can be caused by:

- lack of network capacity, particularly to cope with storm flows;
- blockages or collapses in the sewer; and
- local flooding.

Solving sewer flooding issues often requires an integrated approach to all drainage within catchments, be it rivers, culverts, road drainage or sewers. This can be technically complex and may require joint funding solutions from a range of parties, including local authorities, Scottish Water and local land owners.

- Water pressure

Low water pressure can cause particular issues with appliances such as boilers and electric showers, as well as causing general inconvenience to customers. The cost of solutions varies and increasing the pressure within the water network can bring other problems, such as higher levels of leakage and more bursts.

We would expect Scottish Water to include investment for improvements to customer service provided:

- there is a clear and measurable customer demand;
- the investment is properly targeted and is cost effective; and
- customers as a whole are willing to pay the incremental cost.

In the *Strategic Review of Charges 2006-10* we will examine Scottish Water's quality investment proposals to ensure that these criteria are met.

4.4 Funding the quality programme

We believe that it is important that each generation pays for the use they make of the asset base. In our recent publication *'Our work in regulating the Scottish water industry: The calculation of prices'*³, we explained our proposals to move to a regulatory capital value (RCV) approach to assessing price caps. One of the advantages of this approach is that it is more transparent, because one generation does not subsidise another.

In calculating the required revenue for Scottish Water, we take account of the annual depreciation on non-infrastructure assets (for both existing and new assets). We explained that this depreciation will be calculated using standard asset life categories. These are illustrated in Table 4.1.

Table 4.1: Standard asset lives and depreciation

Asset life category	Expected life (years)	Annual depreciation rate (%)
Very short	5	20%
Short	10	10%
Medium	20	5%
Medium/long	40	2.5%
Long	60	1.7%

For example, if Scottish Water were to add £50 million of medium/long life assets through the quality investment programme, then for the following 40 years Scottish Water would be allowed to collect £1.25 million (in real terms) from customers. In this way customers pay for the assets while those assets provide a service.

Scottish Water will also be allowed to collect the financing costs of its investment through a cash return on the RCV. Customers therefore pay each year both for the use they make of the asset base and for the cost of financing the asset base.

4.5 Quality investment in the water industry in Scotland

In Chapter 2 we described the Quality and Standards process, which determines investment priorities for the water industry in Scotland. We explained that the first Quality and Standards process covered the period April 2000 to March 2002. This was the first time that an integrated investment programme had been developed for the Scottish water industry.

We noted, however, that there was a lack of definition of the outputs required from *Quality and Standards I*. In our *'Investment and asset management report 2000-02'* we explained that around 52% of the total of £976 million of *Quality and Standards I* investment related to quality investment (the remainder related to capital maintenance and supply and demand).

Quality and Standards II defined the quality investment programme in more detail. The 'WIC 18' project list⁴ indicates that quality investment accounts for around 50% of the total £1.8 billion spend, comprising around 1,200 projects.

The figures indicate that actual and forecast investment in improving the water quality and environmental performance of the water industry in Scotland is running at around £220 million per annum. Over the period of the Quality and Standards programme, it has consistently represented around half of total investment.

Quality and Standards III has confirmed that this level of investment in water quality and environmental performance is likely to continue for the foreseeable future. In its *Quality and Standards III* consultation, the Scottish Executive states⁵:

"What is certain, is that substantial expenditure on the improvement of the water environment will be required for very many years to come, for Quality and Standards III and beyond."

³ Volume 3 – *Our work in regulating the Scottish water industry: The calculation of prices.*

⁴ WIC18 : Quality and Standards Final Output – 30 May 2001.

⁵ Scottish Executive, *Investing in water services 2006-14*, page 31.

It is therefore important for customers that we seek to ensure that these quality improvements are delivered efficiently.

4.6 Quality investment in the water industry in England and Wales

In England and Wales the companies submit investment and asset management plans with their business plans. These are based on guidance from Ministers and the detailed requirements of the Environment Agency and Drinking Water Inspectorate.

Ofwat examines the total investment in England and Wales each year in its financial performance report⁶. It reports total investment split into categories of base, infrastructure renewals, quality⁷ and growth⁸. Table 4.2 sets out the quality investment in England and Wales since 1995-96.

Table 4.2: Quality investment in England and Wales

(2003-04 prices)	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04
Total investment (£ million)	3,073	3,752	4,154	4,031	3,958	2,897	3,077	3,508	3,662
Quality investment (£ million)	1,510	1,696	1,829	1,878	1,888	1,233	1,266	1,448	1,547
Percentage of total	49.1%	45.2%	44.0%	46.6%	47.7%	42.6%	41.1%	41.3%	42.2%

Quality investment in England and Wales in recent years has run at around 45% of total investment. This is slightly lower than the 50% of total investment that is reported in Scotland. There are a number of reasons why the reported quality spend in Scotland could be higher than that in England and Wales. These include:

- The increased spend on quality in England and Wales in the early 1990s, immediately following privatisation. This has left an element of 'catch-up' required in Scotland; and

- Differences in the way costs are allocated between 'capital maintenance' and 'quality expenditure'. For example, work associated with water mains renewal brings both capital maintenance and quality benefits.

Our assessment of Scottish Water's investment plan will include an analysis of its quality investment programme and a comparison with England and Wales.

As discussed in the previous chapter⁹, we believe that investment in capital maintenance should be the priority in any investment programme. Statutory improvements to water quality and environmental performance can then be costed on an incremental basis. This costing should take full account of any opportunities for optimisation and synergy with the capital maintenance programme.

4.7 Our approach to Scottish Water's quality investment programme

In assessing Scottish Water's quality investment proposals in the *Strategic Review of Charges 2006-10* we will take account of:

- ministerial guidance on the overall objectives of the investment programme, with particular reference to quality objectives;
- the quality investment requirements identified in the *Quality and Standards III* process;
- the quality investment requirements identified in Scottish Water's initial and final business plan submissions; and
- the Reporter's assessment of Scottish Water's quality investment programme.

We will require a detailed investment plan which defines:

⁶ Financial Performance and expenditure of the water companies in England and Wales

⁷ Quality is split into quality enhancement programmes and enhanced service levels.

⁸ Growth is called supply/demand.

⁹ Chapter 3, 'Capital maintenance', section 3.10.

- the projects that comprise the programme, by asset;
- the outputs that each project will deliver;
- the expected costs for each project; and
- expected delivery dates.

Our business plan guidance specifies the format of this investment plan. The format of the investment plan is included at Appendix 1.

The Reporter's assessment of Scottish Water's quality investment proposals will form a key part of our analysis. We have provided detailed guidance to the Reporter on the particular areas we wish his audit of the quality programme to address. These include an assessment of:

- whether Scottish Water has provided a consistent interpretation of legal obligations and the ministerial guidance;
- whether Scottish Water has included all of the agreed requirements of the quality regulators – we have also asked the Reporter to comment on Scottish Water's challenge of quality obligations placed on it by the quality regulators as part of *Quality and Standards III*; how Scottish Water has interpreted the Water Framework Directive and other key legislation which impact significantly on costs;
- the design criteria used by Scottish Water and whether these are consistent with the criteria used to develop the standards;
- Scottish Water's costing process;
- whether the additional operating costs identified from the quality programme are additional, reasonable and have been applied consistently;
- whether Scottish Water has costed the quality programme in an incremental way, taking full account of any optimisation and synergy benefits; and

- cost estimates for defined projects.

We will also assess the scope for efficiency in delivering the quality programme. This is discussed in greater detail in Chapter 14. We will also examine the phasing of the overall investment programme to ensure that it is deliverable.

4.8 Summary

In recent years, investment in the water industry in Scotland to improve water quality, the environment and customer service has accounted for around 50% of the capital investment. This equates to £220 million, or £95 per customer annually.

Much of this investment has been driven by EU legislation for improved water quality and environmental standards. Investment at this level will continue throughout *Quality and Standards III* and for the foreseeable future. This level of investment cannot be considered as a short-term 'peak'.

It is in the customer interest to ensure that Scottish Water's quality investment proposals are:

- properly defined;
- accurately costed; and
- effectively and efficiently delivered.

In the *Strategic Review of Charges 2006-10*, we will examine Scottish Water's quality investment proposals in detail to ensure that they are justifiable, accurately assessed and meet the requirements laid down by the Minister and the relevant regulators.

4.9 Questions for consultation

1. Do respondents agree with our proposed approach to assessing Scottish Water's quality investment programme?
2. Are there other factors that we should take into account to ensure customers receive value for money?

Section 1: Chapter 5

Investment to balance supply and demand

5.1 Introduction

Customers expect the water supply system to deliver clean water to their homes and places of work as and when they require it. They also expect the sewerage system to remove and treat their wastewater, to drain public areas, and to protect them from flooding by surface run off.

In order to meet these expectations, Scottish Water must invest in its water and wastewater capacity. It must also ensure that it is able to meet reasonable demand for those services.

The capital investment required to achieve these objectives places a significant upward pressure on prices. Customers, however, are concerned that water and sewerage services are provided to them at an affordable price. It is therefore essential that the investment that Scottish Water makes in the water and wastewater capacity is carried out in an efficient way. Investment planning is critical to the efficient delivery of Quality and Standards outputs.

During the current regulatory control period there have been increasing complaints from stakeholders about development constraints. Such development constraints may be controlled through better management of the supply and demand balance.

5.2 Investment in the water supply

5.2.1 The issues

The basic water resource problem that Scottish Water faces is to match the supply and the demand for clean water. This involves forecasting future demand for water, then comparing the forecast with the capacity of the existing water supply system. If the existing capacity is insufficient to meet forecast customer demand then the planner must find a solution that will close the gap. Forecasting demand is a complex process for a number of reasons:

- Demand can be highly variable:
 - Demand varies over time, in the short term as a result of changes in the seasons or changes in the weather, and in the long term as a result of trends (both growth and decline) in the population and the economy.
 - Demand also varies by location; demand in certain locations may be very high and in others it may be low. Over time, even if total demand stays constant, the pattern of demand may vary considerably, with demand rising in some areas and falling in others.
- Supply can also be highly variable:
 - The water supply capacity of existing assets can vary over time. Within a year, seasonal changes in the weather have an impact on how much water is available from a particular source. Variations in the weather between years also have an impact, and in the long term the climate itself may be changing.
- Forecasts of supply and demand are uncertain:
 - Demand may turn out to be higher, or supply may turn out to be lower, than forecast. Where this happens, it is important that customers receive the water they demand, as long as the situation is not extreme (for example, during a period of extended drought). In order to have spare capacity, planners allow for an additional supply or 'headroom'; this spare capacity is expensive to provide, so must be set at an appropriate level. Establishing an appropriate level requires detailed technical and economic analysis.

Scottish Water's approach to water resource planning

It is important that expenditure to address supply/demand issues is efficient. It is not efficient to invest in the water supply system simply to 'be on the safe side'; water resource planners must balance the requirement to maintain sufficient resources with the need to avoid unnecessary investment.

There is some evidence that the approach taken by the water industry to water resource planning may not have been economic in the past:

- Scottish Water's regulatory returns suggest that, given the volume of water that is supplied, asset replacement costs are very high for the water supply system in Scotland. Around £800 million was allowed in *Quality and Standards II* for asset replacement costs. Similarly, pumping costs in Scotland are very high in relation to the amount of water that customers demand.
- The water treatment capacity in Scotland is high relative to the volume of water that customers demand. Scottish Water has the capacity to treat 3500 Mld of water. Scottish Water estimate customer demand at 1360 Mld.
- The reported level of leakage in Scotland is also high. Although there is considerable uncertainty about the true level of leakage, best estimates suggest that nearly half (48%) of all treated water is lost through leakage. This is high relative to average levels in England and Wales (leakage levels for companies south of the border vary between 15% and 35%).

This evidence might suggest that customers in Scotland are paying for a water supply system that is expensive and inefficient. This is not to ignore other explanations for the relatively high cost of the water supply system in Scotland¹.

5.2.2 Why might costs of water supply be high in Scotland?

Several explanations could be put forward as to why water supply costs, and in particular asset replacement costs, are high in Scotland.

- Some might assert that Scottish Water's asset base contains a high proportion of ageing and worn out assets. However, our 'Investment and asset management' reports examine this issue and have

shown that the condition and age of the assets in Scotland are comparable with those south of the border (see Chapter 6 for further information).

- Scottish Water may be inefficient in carrying out its asset replacement programme (that is purchasing new assets and putting them in place). There is evidence of such inefficiency in Scotland².
- Finally, it could be that the Scottish water industry has not been efficient in its approach to the supply/demand balance. Although Scottish Water is constrained by the networks it inherited, the decisions it takes about replacing and refurbishing its assets have an impact on the economic efficiency of the network. For example, by reducing leakage it may be possible to reduce future expenditure on treatment and pumping capacity.

5.2.3 An economic approach to water resource planning

Water resource planning should be carried out on an economic basis. This means that the water resource planning process should be driven by the likely cost to customers and to the environment of different supply/demand planning solutions. An economic solution seeks to minimise these costs.

An economic approach should include the following elements:

- A detailed description of the planning problem. This should cover a sufficiently long planning period, typically a minimum of 20 years. It should also be sufficiently detailed to include any forecast shortages at particular times in particular locations;
- A comprehensive review of the options for balancing supply and demand. This includes possible resource options, pricing policies and leakage reduction schemes. The potential contribution of each of these options should be identified, along with a proper assessment of their costs, taking account of financial, environmental and social elements (such as

¹ See Volume 4, Chapter 5.

² See WIC 5.

the disruption caused to local people by building work for a new treatment works);

- An analysis of risks. The approach should show how risks have been taken into account; and
- A demonstration that the water resource planning solution minimises the overall cost of matching supply and demand.

In making decisions, both about existing and new demand, Scottish Water should adopt an economic approach, whereby choices are made with reference to the costs for customers and for the environment.

High levels of investment to replace the assets, or high levels of leakage, can only be justified by Scottish Water on the basis of detailed economic and cost benefit analysis.

5.2.4 Our proposed approach

We will assess Scottish Water's approach to water resource planning as part of the *Strategic Review of Charges 2006-10*. Our assessment will consider whether or not Scottish Water has adopted an economic approach. For example, we will require evidence that a comprehensive range of supply/demand balance options has been considered and that the costs of these have been properly estimated.

Our assessment will contribute to our understanding of the efficient level of capital and operating costs for Scottish Water.

Our analysis of water resource planning will at the same time influence our views about the role that might be played by the supply/demand policies that Ofwat adopts for the companies in England and Wales, including the use of targets to reduce leakage. If there is a case for setting such targets, we would propose to introduce these as part of this Strategic Review of Charges.

5.3 Investment in the wastewater system

5.3.1 The issue

The basic wastewater planning problem that Scottish Water faces is to match supply and demand for sewerage and sewage treatment services. This involves forecasting future needs for sewerage and sewage treatment, then comparing the forecast with the capacity of the existing sewerage and sewage treatment system. If the existing capacity is insufficient to meet the customers' forecast need (demand) then the planner must find a solution that will close the gap.

Balancing supply and demand for wastewater services is a complex process for the following reasons.

- Demand can be highly variable:
 - The wastewater produced by homes and businesses can vary, along with the demand from these customers for clean water. Of yet more significance is the impact on demand that the weather can have. Storm conditions produce run-off from hard surfaces that finds its way into the sewerage system. Sewage treatment facilities must be designed to cope with such additional flows.
- Supply can be highly variable:
 - In storm conditions, wastewater treatment works can become overwhelmed with wastewater flows. Wastewater will then spill through 'combined sewer overflows' or be discharged directly. As a result, the works will fail to meet their discharge standards.
- Forecasts of demand are uncertain:
 - The variation in volumes of wastewater that enter the sewerage system because of changes in weather conditions far outweighs any uncertainty about the volume of wastewater discharged by households and businesses. That said, there is scope for uncertainty in terms of the 'load', or content, of discharges by businesses. Different industries and different industrial processes produce different waste products. These have an impact on the type of wastewater treatment processes that are required at treatment works.

Scottish Water's approach to wastewater treatment planning

Scottish Water must take account of these factors in trying to ensure that reasonable customer demands are met. It cannot, however, invest in the capacity of its sewerage and sewage treatment system just to be on the safe side. Wastewater services must be supplied at as low a sustainable price as possible.

There is some evidence that the approach taken by the water industry in Scotland to wastewater supply-demand balance planning may not have been economic. Developers have argued that there are physical constraints at some points on the sewerage and sewage treatment network. These constraints include a lack of the following:

- availability of the physical connection from the development to the sewerage system;
- capacity on the existing local sewerage network; and
- capacity at the existing wastewater treatment works.

Developers argue that these constraints prevent them from developing new housing and commercial premises. *Quality and Standards II* earmarked funds to address some of these development constraints; it is likely that *Quality and Standards III* will earmark further funding to addressing these constraints.

5.3.2 Why might the cost of sewerage be too high?

There are two possible reasons why sewerage costs, and in particular the cost of new connections, are high in Scotland:

- It could be that Scottish Water has considered a full range of wastewater service options and selected an economic approach. If the level of demand for sewerage and sewage treatment services is very high relative to existing capacity, the efficient cost of providing these services is high and developers are receiving a valid price signal.

- Alternatively, it might be that Scottish Water has not considered a complete range of possible solutions to the problem of meeting demand for sewerage services. If the demand for wastewater services is being addressed with high-cost solutions, development constraints caused by a lack of wastewater capacity might be relieved by better planning.

An economic approach to wastewater service planning

Wastewater service planning should be carried out on an economic basis. The approach should include the following elements:

- A detailed description of the planning problem. The possibility that there are development constraints in Scotland suggests that this analysis should be detailed and should include the different elements of wastewater service provision, ie local networks, sewerage mains and wastewater treatment works;
- A comprehensive review of the possible options for balancing supply and demand. This includes identifying options that might relieve pressure on wastewater treatment works, such as alternative urban drainage systems and pricing policies. The potential contribution of each of these options should be identified, along with a proper assessment of their costs, taking account of financial, environmental and social elements;
- An analysis of risks associated with individual options and with the solution as a whole; and
- A demonstration that the waste water service planning solution minimises the overall cost of matching supply and demand.

Adopting an economic approach to wastewater supply/demand planning is important in the context of meeting both existing demand and new demand. This is because different approaches to providing wastewater solutions, whether for existing or new demand, will have different cost consequences.

5.3.3 The proposed approach to wastewater supply/demand planning

We will assess Scottish Water's approach to sewerage and sewage treatment planning as part of the *Strategic Review of Charges 2006-10*. This assessment will consider whether or not Scottish Water has adopted an economic approach. For example, we will require evidence from Scottish Water that a comprehensive range of wastewater supply-demand balance options has been considered and that the costs of these have been properly estimated.

If we identify weaknesses in the planning process, we will consider their impact on the capital replacement and refurbishment policies that have been adopted by Scottish Water. We will also consider their impact on the 'development constraint' problems that have been reported by developers. This assessment will contribute to our understanding of the efficient level of capital and operating costs for Scottish Water.

5.4 Questions for consultation

1. Do respondents agree with our proposed framework for assessing Scottish Water's water resource and sewerage and sewage treatment planning?
2. Are there other factors that we should take into account to ensure customers receive value for money?

Section 2: Chapter 6

Capital expenditure in the Scottish water and wastewater industry

This chapter starts by considering the nature of the assets in Scotland. It then examines historic levels of capital investment in the water industry in Scotland. We also consider progress to date in delivering the *Quality and Standards II* investment programme.

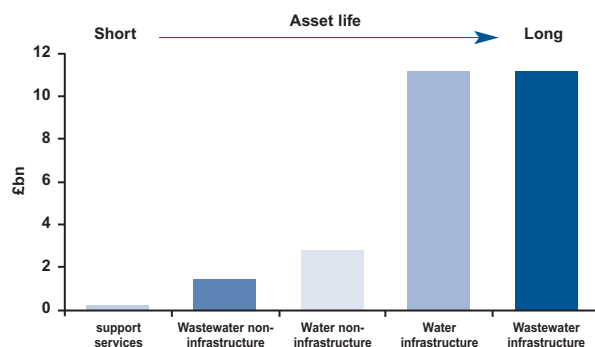
6.1 Water and wastewater assets in Scotland

In Chapter 3 we explained that the range of assets required to deliver a water and wastewater service can be divided into five broad types:

- water infrastructure;
- water non-infrastructure;
- wastewater infrastructure;
- wastewater non-infrastructure; and
- support services.

Scottish Water's assets are, in general, characterised by long life assets, as Figure 6.1 illustrates. This has an impact on decisions about the investment requirements for the business; long-term planning is required to ensure that the assets are maintained for future generations.

Figure 6.1: Replacement cost and asset life by type of asset



Comparison with England and Wales

It is useful to compare the physical size of Scottish Water's asset base with that of the ten water and wastewater companies in England and Wales. This provides an indication of the relative scale and complexity of the assets.

For ease of comparison, given some differences in reporting formats between Scotland and England and Wales, we have focused on the four main components of a water and wastewater company's asset base, namely water treatment works, water mains, wastewater treatment works, and sewers.

These comprise more than 80% of the replacement cost of the total asset base.

Table 6.1: Comparison of the asset base

	Scottish Water	Ranking	Water and wastewater companies in England and Wales		
			Smallest	Mean	Largest
Length of water mains (km)	46,508	1st	11,226	27,706	45,674
Length of main per property (m)	18.74	5th	9.07	15.94	21.10
Length of sewers (km)	44,854	3rd	8,820	30,573	67,151
Length of sewer per property (m)*	13.34	7th	11.93	13.68	14.85
Number of water treatment works	371	1st	33	102	154
Number of wastewater treatment works**	616	4th	349	630	1,071

* Excludes lateral sewers as they are not part of the sewer network in England and Wales.

**Excludes 1,220 very small public septic tanks installations, which are uncommon in England and Wales.

Scottish Water is responsible for a larger geographic area than any of the water and wastewater companies in England and Wales. However, the total length of water main is not materially greater than that of some of the companies in England and Wales. This no doubt reflects the fact that a high proportion of the Scottish population lives in the central belt and in coastal communities.

A similar picture emerges when comparing the length of sewer networks either side of the border. Of the UK water and wastewater companies, Scottish Water ranks third for the total length of its sewers¹. Clearly, a larger

¹ This is despite the fact that differences in legislation in Scotland mean that, unlike in England and Wales, Scottish Water has responsibility for the parts of the sewer network, termed 'laterals', which run between the main sewer and the edge of customers' properties. These laterals account for around 10,000km of the total sewer length.

geographic area does not mean that there is a larger sewer network.

There are significantly more water treatment works in Scotland than in England and Wales. This can in part be attributed to the large number of small rural communities, particularly around the coastline in the north. However, of the 371 works in Scotland, 240 fall into the smallest reported category, with a capacity of less than 1 megalitre per day. This may indicate that in Scotland a less proactive approach has been taken to rationalising works. This has a potential impact on customers by increasing costs and making water quality management more complex.

Of the 1,836 wastewater treatment works in Scotland, 1,220 are very small public septic tank installations. These are relatively uncommon in England and Wales. Excluding these septic tanks, the number of wastewater treatment works in Scotland is similar to the number for companies in England and Wales.

In summary, the asset base that Scottish Water operates is broadly similar in size and composition to that of the water and wastewater providers in England and Wales. The challenges that Scottish Water faces in managing this large portfolio of assets are significant, but are not materially different from those faced by companies south of the border.

In Chapter 3 we described our proposed, three-stage approach to assessing Scottish Water's capital investment requirement. This approach considers each of three investment drivers and ensures that investment in improving the quality of service to customers has already taken account of capital maintenance. Similarly, the response to customers' changing demand patterns should take account of both capital maintenance and quality investment².

² See Chapter 5.

³ PFI investment is assumed to be carried out at benchmark efficiency and therefore is not adjusted for efficiency.

⁴ The capital inefficiency for 2003-04 is an estimate, based on the performance of past years.

6.2 Historic investment in Scotland

Investment in the water industry in Scotland began to increase significantly after the three former water authorities were established in 1996.

Considerable use was made of Private Finance Initiative (PFI) schemes in the late 1990s to deliver the investment required to comply with the Urban Waste Water Treatment and the Bathing Waters Directives.

PFI investment is repaid over a number of years through an annual charge, rather like a loan or mortgage. This means that effective investment in the water industry in Scotland in recent years is higher than might first appear when examining the figures for direct capital investment. We take account of this in our analysis of historic investment levels.

When comparing investment levels in Scotland with those in England and Wales, we also need to take account of the relatively poor capital efficiency of the industry in Scotland. By 'efficiency' we mean that the same, or a better, investment output is delivered for less money. Actual cash expenditure in Scotland needs to be adjusted for inefficiency³ so that a fair comparison can be made with investment by companies with higher efficiency.

Table 6.2 reconciles the actual direct investment in the water industry in Scotland with the effective efficient investment spending that has benefited customers.

Table 6.2: Total investment 1996-2004⁴

Year	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04
Direct capital investment	£252m	£277m	£346m	£397m	£428m	£460m	£353m	£389m
Investment delivered through PFI	£3m	£15m	£15m	£136m	£170m	£126m	£65m	-
Total investment	£255m	£292m	£361m	£533m	£598m	£586m	£418m	£389m
Assessed capital inefficiency	£60m	£78m	£107m	£139m	£163m	£175m	£128m	£141m
Total efficient effective investment	£195m	£214m	£254m	£394m	£435m	£411m	£290m	£248m

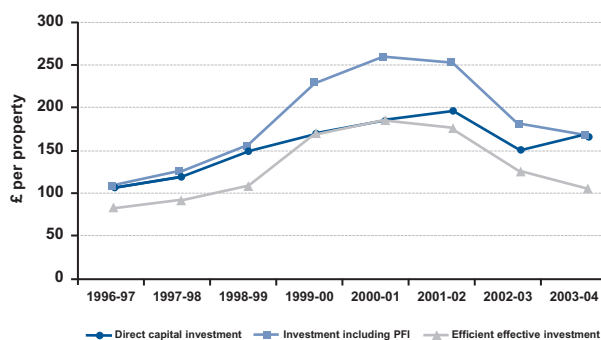
The figures indicate the growth in investment that has taken place in Scotland in the period since 1996-97. In the last two years, since Scottish Water was formed, there has been a decline in the level of investment. Scottish Water attributes the delay in delivering the *Quality and Standards II* investment programme to the time taken to establish Scottish Water Solutions⁵. We discuss the progress in delivering *Quality and Standards III* in more detail below.

Absolute levels of investment do not, in themselves, present a complete picture of investment. A more indicative measure may be the level of investment per property. Table 6.3 and Figure 6.2 show the level of capital investment per property in Scotland.

Table 6.3: Levels of capital investment in Scotland per property

Year	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04
Direct capital investment	£109	£119	£149	£171	£184	£198	£152	£168
Investment including PFI	£110	£126	£156	£230	£258	£253	£180	£168
Efficient effective investment	£84	£92	£109	£170	£188	£177	£125	£107

Figure 6.2: Levels of capital investment per property



It is clear that there has been a significant increase in investment per property since the three water authorities were formed. The relative inefficiency of capital expenditure planning and delivery in Scotland has, however, cost customers some £1,062 million since

1996 (in 2004 prices). This is equivalent to £458 for each property served by the industry in Scotland⁶.

We will continue to monitor and report on Scottish Water's performance in achieving the efficiency targets set out in the last *Strategic Review of Charges*. We will also set targets in the *Strategic Review of Charges 2006-10*; the targets will promote further efficiency improvements in delivering capital investment by Scottish Water.

Comparison with England and Wales

To make direct comparisons of levels of investment in Scotland with those in England and Wales is not a straightforward process. In addition to differences of geography and population density, adjustments also need to be made to reflect differences in the timing of investment and to reflect the significant use of PFI schemes in Scotland.

The level of investment in England and Wales increased significantly after privatisation in 1989. By 1996-97, the privatised companies were investing some £3.5 billion per year. A significant proportion of this investment was driven by the Urban Waste Water Treatment and the Bathing Waters Directives.

Investment in England and Wales has recently stabilised at around £3 billion a year. The *Strategic Review of Charges 2002-06* foresees investment in Scotland stabilising at an average level of around £450 million each year.

We can compare the levels of investment in Scotland with that in England and Wales using the measure of investment per property. As before, we adjust the investment in Scotland to take account of the impact of PFI and the different level of efficiency in Scotland.

⁵ Scottish Water Solutions is a joint venture partnership formed by Scottish Water to deliver the *Quality and Standards II* investment programme.

⁶ In cash terms the total is £991 million, or £427 per property.

Table 6.4: Levels of effective efficient capital investment per property

Year	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04
Scotland	£84	£92	£109	£170	£188	£177	£125	£107
England and Wales	£144	£167	£167	£166	£125	£136	£157	£168

Figure 6.3: Levels of effective efficient capital investment per property



As Figure 6.3 indicates, investment per property in Scotland since 1996 is broadly on a par with that in England and Wales. In the period 1999 to 2002, the level of effective efficient investment in Scotland rose above that of England and Wales. This effectively reversed the difference that had existed when the three former water authorities were established in 1996. Although in 2003 and 2004 investment has fallen back below that of England and Wales, it is still higher than during the early years of the three authorities. This reduced level of investment may have been a necessary step in improving efficiency and therefore ensuring that future investment is affordable and delivers the required outputs.

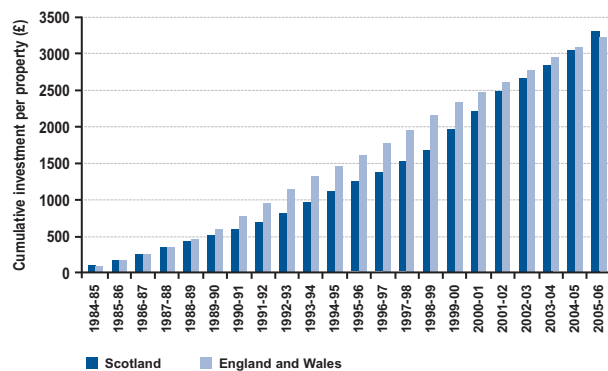
Longer term investment trends

This chapter has so far focused on the period since 1996 when the three former water authorities were established. We have relatively reliable and consistent information about investment levels in Scotland for that period.

Information about investment is available for the years before 1996 from the capital account of local authority returns. However, this may understate the true level of investment and maintenance expenditure as it is likely to exclude some asset costs that were charged to the revenue account. However, we can use the information on capital spending before 1996 to estimate the long-term profile of investment per property in Scotland over the period from 1984-85 to 2005-06. We do have reliable information on investment in England and Wales for this period.

This analysis shows that investment per connected property in Scotland will have matched that in England and Wales over the period 1985-2006. Although investment in England and Wales was higher immediately after privatisation, the situation has reversed in recent years. By the end of *Quality and Standards II*, Scotland will have invested more per property in cash terms than England and Wales over a 10-year and a 20-year period.

Figure 6.4: Cumulative investment per property in Scotland and in England and Wales 1984 -2006⁷



If there is a significant backlog of investment in Scotland relative to that in England and Wales this can only be as a result of inefficiency, not a lack of investment funds. There is therefore no justification for poorer customer service or operational efficiency. Customers in Scotland have paid for, and so deserve, an equivalent standard of service.

⁷ Adjusted for inflation and for the effect of PFI investment. Efficiency adjustment is not included. The forecast expenditure in Scotland for 2004-05 and 2005-06 is based on figures supplied by Scottish Water.

6.4 Condition of Scotland's asset base

The regulatory return, provided to us each year by Scottish Water, contains information about both the physical state of the assets (condition) and their ability to carry out their function (performance). An asset's performance will depend on:

- its condition;
- how it is operated; and
- its capacity to carry out its required role.

It is possible for an asset in reasonable condition and of adequate capacity to perform badly through poor operating practice. Similarly, an asset which is not in the best condition can, through skilful management, be made to perform acceptably.

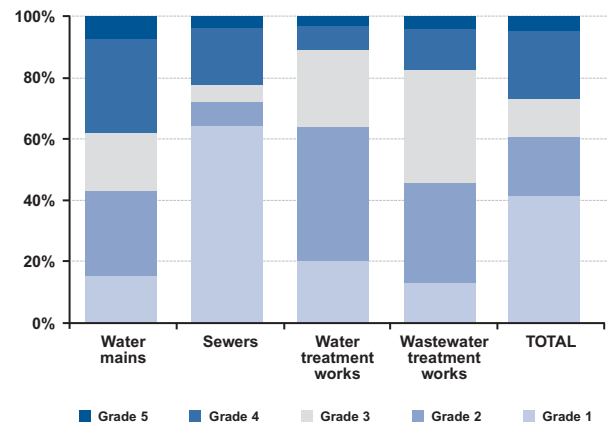
We believe that it is vital that Scottish Water continues to make progress in developing its understanding of both the condition and performance of its assets. This will significantly improve the efficiency and effectiveness of investment.

The four main components of a water and wastewater company's asset base are water treatment works, wastewater treatment works, water mains and sewers. Together, they comprise more than 80% of the replacement cost of the total asset base. We therefore focus our analysis on these four elements.

Asset condition

Asset condition is assessed on a scale of 1-5, with 1 representing 'very good' and 5 representing 'very poor'. Figure 6.5 shows the condition of the assets in Scotland, as submitted by Scottish Water in its Annual Return 2003-04.

Figure 6.5: Condition of Scotland's asset base⁸



The information highlights the relatively poor condition of water mains in Scotland, with nearly 40% categorised as 'poor' or 'very poor'.

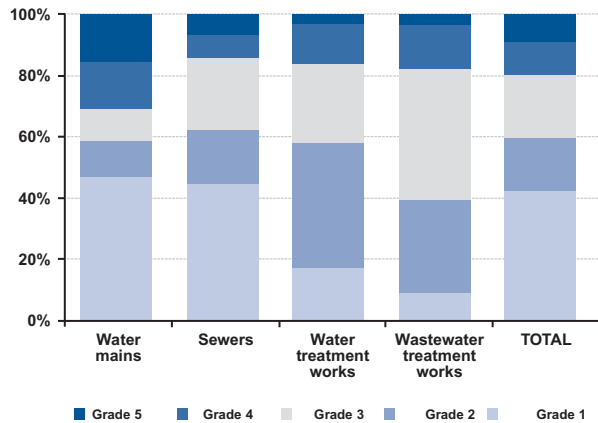
In the *Quality and Standards II* investment programme, which runs from 2002 to 2006, Scottish Water is tasked with delivering 3,051km of water main replacement.

In other categories the condition profile of the assets appears more evenly spread. However, ongoing investment will be required if there is to be no overall reduction in the condition of the asset base.

Asset performance

The performance of an asset has a more direct impact on the service that customers receive. Analysis of asset performance is measured using a similar, five-point scale. Here, 1 denotes an 'excellent' asset, and 5 represents a 'failing' asset.

⁸ From Scottish Water's Annual Return 2003-04. Does not include redundant and decommissioned assets.

Figure 6.6: Performance of Scotland's asset base⁹

Scottish Water's asset performance grades are relatively evenly distributed. On average, around 20% of the assets are in categories four and five. The performance of water mains does appear to be poorer than those of other categories of assets: this is likely to be linked to the relatively poor water main condition grades noted above.

Condition and performance grades, when properly combined with assessments of risk, provide important evidence about where investment should be targeted to improve overall network performance.

Comparison with England and Wales

To compare the condition of assets in Scotland with those in England and Wales we have used the information from Scottish Water's Annual Return 2003-04. We have compared this with 1997-98 Asset Inventories of the companies south of the border. Although information for the companies south of the border is six years older, this is a relatively short period for assets with long useful lives.

We show information about the distribution of assets by condition grade for ten English and Welsh water and wastewater companies¹⁰. We have calculated the mean for these ten companies. We have not identified the companies south of the border for reasons of commercial confidentiality.

We have focused on the percentage of each asset class in condition grades 4 ('poor') and 5 ('very poor'), as these are the assets that are potentially more expensive to operate.

Table 6.5: Comparison of assets in condition grades 4 and 5¹¹

	Scottish Water	Ranking	Water and wastewater companies in England and Wales		
			Best	Mean	Worst
Water mains	38%	10th	2%	11%	54%
Sewers	22%	9th	4%	11%	32%
Water treatment works	9%	5th	2%	13%	39%
Wastewater treatment works	15%	6th	2%	15%	24%

This analysis shows that, with the possible exception of water mains, the condition of assets in Scotland is broadly similar to that in England and Wales. For all asset categories, the percentage of 'poor' and 'very poor' assets in Scotland lies within the range for companies in England and Wales.

As such, poor asset condition would not appear to justify either poorer customer service or a lack of progress towards benchmark efficiency.

We have analysed the percentage of each asset class in performance grades 4 ('borderline') and 5 ('fail') to compare the performance of assets in Scotland with those in England and Wales.

⁹ From Annual Return 2003-04. Does not include redundant and decommissioned assets.

¹⁰ This is the group of companies that provides both water and wastewater services. Other 'single service' companies operate in England and Wales.

¹¹ The mean shown for England and Wales is the weighted average.

Table 6.6: Comparison of assets in performance grades 4 and 5¹²

	Scottish Water	Ranking	Water and wastewater companies in England and Wales		
			Best	Mean	Worst
Water mains	31%	9th	11%	29%	61%
Sewers	14%	10th	1%	6%	18%
Water treatment works	13%	7th	2%	28%	97%
Wastewater treatment works	16%	7th	1%	19%	92%

This analysis indicates that Scottish Water's assets performance is poorer than might be expected from a comparison of condition. Performance grades, however, remain within the range of companies in each asset category.

Operational policies may be contributing to Scottish Water's poor performance relative to that in England and Wales. As noted earlier, asset condition and operating practices are the two factors that most influence how well an asset performs.

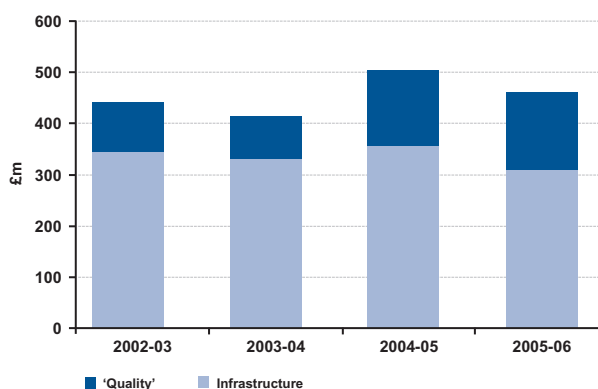
6.5 Progress with investment in the current regulatory period 2002-06

Quality and Standards II defined the planned investment in the water industry in Scotland for the period from April 2002 to March 2006. In the *Strategic Review of Charges 2002-06* we examined the scope for capital efficiency.

We advised that Scottish Water should be required to deliver the full scope of *Quality and Standards II* for £1.8 billion. Customers will wish to be assured that this significant investment in Scotland's water industry – which is vital to ensuring that public health, environmental and customer service benefits are delivered – is being effectively monitored.

Table 6.7: Capital investment set out in the Strategic Review of Charges¹³

Capital investment	2002-03	2003-04	2004-05	2005-06	Review Total
'Quality'	£352m	£331m	£360m	£315m	£1,359m
Infrastructure	£84m	£80m	£140m	£148m	£452m
Total	£436m	£411m	£501m	£463m	£1,810m

Figure 6.7: Capital investment set out in the Strategic Review of Charges

Scottish Water reports performance in delivering the investment programme in its annual June Return and its quarterly capital investment return. The capital investment return provides a breakdown of expenditure at a project level. This allows us to determine whether the expenditure relates to a *Quality and Standards II* project as defined by the WIC18¹⁴ baseline.

Expenditure to date

We can assess Scottish Water's performance in delivering investment by analysing total spending against the investment profile set out in the Strategic Review of Charges. Table 6.8 shows Scottish Water's actual investment expenditure and our first assessment in our annual investment and Asset Management Report 2003-04 published April 2004 of how much of this expenditure relates to *Quality and Standards II* investment.

¹² The mean shown for England and Wales is the weighted average.

¹³ Post efficiency.

¹⁴ WIC18 is the defined list of projects that comprise *Quality and Standards II*. A copy of this letter is reproduced in the *Strategic Review of Charges 2002-06*, page 589. The WIC 18 process is described in detail in Chapter 7 of this document.

Table 6.8: Scottish Water's capital expenditure and assessed extent of Quality and Standards II expenditure¹⁵

Capital investment	2002-03	2003-04	2004-05	2005-06
Strategic review profile	£436m	£411m	£501m	£463m
Cumulative total	£436m	£847m	£1,347m	£1,810m
Scottish Water's capital investment	£353m	£389m		
Cumulative total	£353m	£742m		
Assessed Q&S II investment	£295m	£305m		
Cumulative total	£295m	£600m		

Scottish Water invested £742 million over the first two years of the current review period. This is £105 million less than the investment profile set out in the *Strategic Review of Charges 2002-06*.

We estimated in our Investment and Asset Management Report that no more than £600 million of this investment relates to *Quality and Standards II* projects.

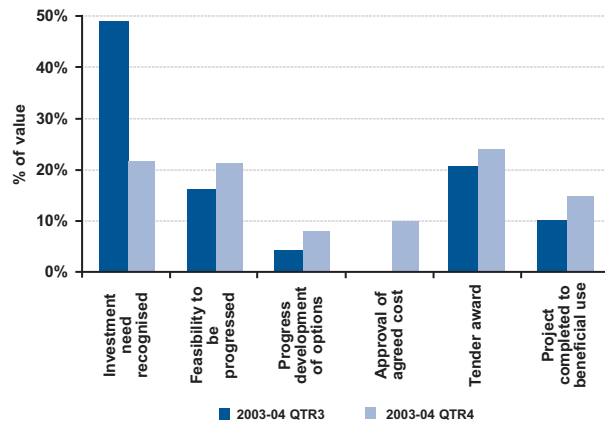
Scottish Water has indicated that much of the difference relates to *Quality and Standards I*. Our analysis¹⁶, however, indicates that investment in the *Quality and Standards I* period was consistent with forecast expenditure.

Progress with delivery

The capital investment return allows us to assess the rate of progress in delivering *Quality and Standards II*. Scottish Water reports progress with projects using a series of project milestones. These range from early recognition of the requirement for investment through to the project achieving 'beneficial use'. Beneficial use means that the output required in *Quality and Standards II* is being delivered.

The proportion of projects at each of the key milestones is shown in Figure 6.8. This reflects the position reported by Scottish Water in its capital investment returns, submitted in January 2004 and March 2004.

Figure 6.8: Quality and Standards II project progress



In our *Investment and Asset Management Report 2002-03* we commented on progress to Quarter 3, 2003-04. We noted our concern that only around 10% of the projects that comprise the *Quality and Standards II* programme had been completed to the beneficial use stage, and that only around 30% of the programme value had passed the financial authorisation stage. We also noted that half of the programme had not yet progressed beyond project feasibility.

The updated figures for the year-end position (Quarter 4, 2003-04) indicate some movement in the programme; however, at the half-way stage in the four-year programme, only around 15% of projects have reached beneficial use. Similarly, around half of the programme remains in the planning stages. Clearly, a considerable increase in activity is required in the last two years of the period. We discuss this in more detail in Chapter 8.

Delivery of the remainder of the Quality and Standards II programme

If Scottish Water phases its capital expenditure in a different way from the profile set out in the *Strategic Review of Charges*, this does not necessarily jeopardise the efficient delivery of this investment. However, Scottish Water faces a significant challenge in

¹⁵ Excludes PFI element.

¹⁶ Investment and Asset Management Report 2000-02

attempting to deliver efficiently the level of investment that is now required for the last two years of the period. Its ability to deliver the investment will also be constrained by other factors, such as the time it takes to consult with customers, achieve planning permission and purchase land.

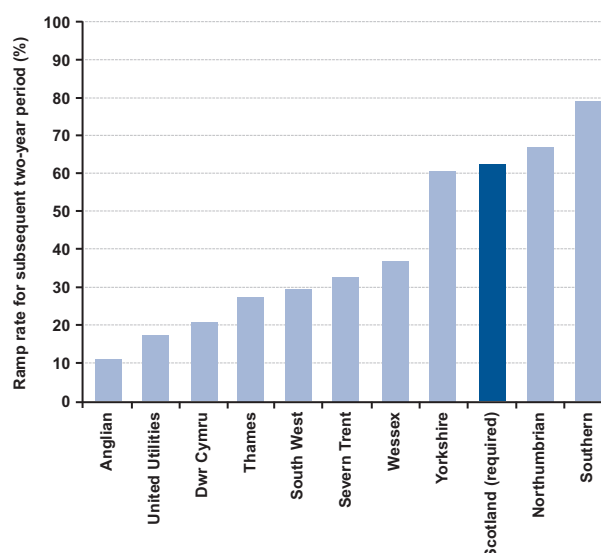
Scottish Water had delivered £742 million of expenditure, of which around £600 million is *Quality and Standards II* investment, by the end of the financial year 2003-04. This leaves more than £1,200 million of *Quality and Standards II* investment to deliver in the remaining two years of the period. This is a 63% increase on the level of expenditure that was delivered in the first two years¹⁷ and is significantly higher than the 14% increase that would have been required had the Strategic Review profile been followed.

Table 6.9: Remaining Quality and Standards II investment

	Total expenditure 2002-2004	Quality and Standards II expenditure 2002-2004	Remaining expenditure 2004-2006	Percentage increase required
Scottish Water	£742m	£600m	£1,210m	63%
Strategic Review profile	£847m	£847m	£963m	14%

To establish the feasibility of achieving the required increase in investment over the remainder of the *Quality and Standards II* period, we analysed the ten-year period from 1992-93 to 2001-02, when investment in England and Wales increased rapidly following privatisation. For each company, we established the maximum ramp rate achieved over any subsequent two-year period. Only two companies south of the border have ever increased investment at the rate required in Scotland to achieve the delivery of *Quality and Standards II*.

Figure 6.9: Maximum historical investment ramp rates



We also examined the increase in investment level required and compared this with the levels that have previously been achieved by the privatised companies in England and Wales.

Table 6.10: Maximum two-year increase in investment, by company

Company	Maximum historical investment ramp rate for subsequent two-year period	Initial two-year investment total (£m)	Attained two-year investment total (£m)	Change in investment (£m)
South West	29%	£251m	£324m	£73m
Wessex	37%	£213m	£292m	£80m
Anglian	11%	£724m	£806m	£82m
Dwr Cymru	21%	£486m	£590m	£104m
United Utilities	17%	£947m	£1,112m	£165m
Northumbrian	67%	£337m	£562m	£225m
Thames	27%	£831m	£1,058m	£227m
Yorkshire	61%	£486m	£784m	£298m
Southern	79%	£375m	£673m	£298m
Severn Trent	33%	£951m	£1,264m	£313m
Scotland (required)	63%	£742m	£1,210m	£468m

¹⁷ This figure assumes that the required increase is based on the total expenditure during the first two years. A more pessimistic assumption would be that the increase should be based on the extent of *Quality and Standards II* delivery during the first two years. This would give a required increase of 102%.

The increase in investment that is required in Scotland for the last two years of the period, at £468 million, is almost 50% greater than the highest level of investment achieved by any company south of the border (Severn Trent, at £313 million).

Scottish Water's first draft business plan

Earlier this year we received assurances from Scottish Water and Scottish Water Solutions that *Quality and Standards II* would be delivered efficiently and on time¹⁸.

Such assurances are inconsistent with the regulatory information that we are receiving from Scottish Water. In its first draft business plan¹⁹, Scottish Water suggests that it now expects that some £260 million of *Quality and Standards II* outputs will not have been paid for by the end of the current regulatory control period. It appears that some £217 million of outputs will not have been delivered. The balance appears to be investment creditors (ie work done but not paid for).

Our view is that speed of delivery is less important to customers than delivering investment efficiently²⁰. It is possible to accommodate delays in an investment programme, provided the money has not already been spent. If Scottish Water try to deliver too quickly the investment it is unlikely to be efficient.

6.6 Summary

This chapter has examined the nature, condition and performance of Scottish Water's assets. It has also considered historic levels of capital investment in the water industry in Scotland, and compared these with investment south of the border. Our analysis confirms that:

- the size and composition of asset base in Scotland is similar to that in England and Wales;
- the condition and performance of the assets in Scotland appears to be no worse than in England and

Wales, and cannot be used to justify poor customer service; and

- by the end of the current regulatory period, investment levels per property in Scotland will be equivalent to England and Wales over the previous 10 and 20-year periods.

This chapter has also discussed progress to date in delivering the *Quality and Standards II* investment programme.

- More than £1,200 million of *Quality and Standards II* investment remains to be delivered in the last two years of the *Quality and Standards* period; and
- Furthermore, Scottish Water's draft business plan indicates that some £217 million of outputs will not have been delivered by the end of the current regulatory period.

As a result, it may be necessary at the *Strategic Review of Charges 2006-10* to accommodate a significant hangover of *Quality and Standards II* outputs. Customers will therefore have to wait longer for the outputs defined in *Quality and Standards III*. This is discussed in more detail in Chapter 8.

6.7 Questions for consultation

1. Are there any factors we should take into account in the *Strategic Review of Charges 2006-10* with regard to historic level of capital expenditure in the Scottish water industry?

¹⁸ Meetings with Scottish Water and Scottish Water Solutions in January 2003.

¹⁹ Scottish Water's draft business plan – October 2004.

²⁰ Investment and Asset Management Report 2002-03.

Section 2: Chapter 7

Lessons learned from establishing the baseline investment programme for Quality and Standards II

7.1 Introduction

In the previous chapter we discussed how the significant *Quality and Standards II* investment programme would narrow the gap in water services investment between Scotland and England and Wales. One of the disappointments of *Quality and Standards II* has been the difficulties faced by both stakeholders¹ and customers in monitoring Scottish Water's delivery of this investment programme. This has resulted from the lack of clearly defined projects and associated outputs that comprised the baseline programme.

In this chapter we consider in detail the process by which stakeholders have attempted to establish² the baseline investment programme for *Quality and Standards II*. We believe that lessons must be learned from these difficulties, and procedures put in place to overcome them, for the *Strategic Review of Charges 2006-10*.

We also discuss the issues that could arise as a result of any 'overhang' of *Quality and Standards II* projects into the *Quality and Standards III* period. This overhang would inevitably have implications for customers and for the levels of capital investment going forward into *Quality and Standards III*. We will discuss this issue in the next chapter.

In Chapter 9 we describe our proposals for defining the investment programme in a very detailed way. We explain that this level of detail is necessary because of the difficulties we have experienced in attempting to establish the baseline investment programme for *Quality and Standards II*.

7.2 First steps in monitoring investment in Scotland

Quality and Standards II defined the investment programme for the period April 2002 to March 2006 at a

high level. We monitor and report on³ progress in delivering this investment programme. This monitoring has been more difficult because of the lack of clarity in the baseline programme.

In this section, we describe how we attempted to establish the baseline for *Quality and Standards II*. We then discuss the lessons learned from this process and how these inform our proposals for *Quality and Standards III*.

Our work with the water authorities

In order to establish the required baseline programme, we asked for a detailed list of projects from each of the three former water authorities in May 2001. This letter, which was termed WIC 18 '*Quality and Standards final output*'⁴ asked the three authorities to provide information for each project that they had included in their baselines, consistent with the outcome of the *Quality and Standards II* consultation.

The format in which we requested the information is set out in Table 7.1. As can be seen, the format comprises a relatively straightforward list of projects and their estimated costs, with a breakdown of project categories between base, quality and growth, water and wastewater and infrastructure and non-infrastructure.

¹ 'Stakeholders' in this chapter means the key players involved in setting the investment targets, including the Scottish Ministers, the Scottish Executive, the Scottish Environment Protection Agency, the Drinking Water Quality Regulator and this Office.

² Although the *Quality and Standards II* baseline investment programme is now substantially defined, elements remain that are yet to be clarified.

³ See Chapter 6 of this document and our publication '*Investment and Asset Management Report 2002-03*', April 2004.

⁴ The WIC 18 letter is published in Volume 1 of our methodology, '*Our work in regulating the Scottish water industry: Setting out a clear framework for the Strategic Review of Charges 2006-10*', Appendix 2, Page 142.

Table 7.1: Format of Quality and Standards II baseline (June 2001)

Reference	Project title	2002-06 expenditure £000	Investment purpose			Water		Wastewater		Other %	Rural/non-rural %
			Base (%)	Quality (%)	Growth (%)	Infra-structure (%)	Non infra-structure (%)	Infra-structure (%)	Non infra-structure (%)		
	(for each project)										
TOTAL											

We did not envisage that the authorities would find it difficult to provide the information we required, 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 relatively detailed investment programme. The East of Scotland Water Authority, however, failed to provide the required level of detail. When Scottish Water was created 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. This decision was understandable, but our concern was to ensure that customers received value for money, so we 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*. 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's efficiency claim. Customers faced higher bills as a result of the claimed efficiencies, because the efficiency target applied to East of Scotland

Water in the *Strategic Review of Charges 2002-06* was less challenging than it would otherwise have been⁵.

In January 2003 we proposed a settlement. The proposal was 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. This would add £16.04 million to the capital efficiency target applicable for each year. Scottish Water's Board notified us on 28 February 2003 that it accepted this proposal. This adjustment to the capital efficiency target will be made in the *Strategic Review of Charges 2006-10*.

Developing the baseline programme and substitution process

While these discussions were ongoing we continued to require Scottish Water to establish a baseline programme for sign off by all of the stakeholders that was consistent with the original responses to WIC 18. This proved to be a time consuming and complex task.

The initial stage was to disaggregate the information in the original WIC 18 submissions from the three authorities. In many cases, particularly for the former East of Scotland Water Authority investment programme, a wide range of individual projects had been amalgamated into a single overall description, such as 'East of Scotland Water reservoirs' and

⁵ 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.

'corporate billing systems'. In order to be able to monitor and report on progress in achieving the programme, we needed these overall descriptions to be broken down into individual, named projects with specific outputs.

The next step in our analysis 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 the 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 was hence a candidate for replacement with an alternative project; while the 'green' category was for WIC 18 projects that were still required and could proceed.

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 had emerged during the initial stages of analysis. 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 was funded separately and therefore 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 requirement to specify the projects associated with the £50 million of 'high priority' spend allocated by the Minister for the Environment and Rural affairs in the Quality and Standards II programme.* We had originally asked for a list of these projects in a letter,

WIC 16⁶, which we issued in May 2001. The funding was intended to ease development constraints and help with first time sewerage provision in rural areas.

- *The treatment of expenditure associated with projects from the Quality and Standards I investment programme which had overrun into the Quality and Standards II period.* Scottish Water's initial estimate of the extent of these costs was as high as £157 million.

High level principles to underpin the substitution process were agreed 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*.

Scottish Water has issued a series of WIC 18 baseline project lists in an agreed format. The stakeholder group examines the list of projects and brings errors and omissions to the attention of Scottish Water.

Each iteration of the WIC 18 list brings fewer changes. Many of the projects contained in the original WIC 18 submissions remain in the current version of the baseline programme.

Scottish Water cannot claim that non-delivery of *Quality and Standards II* results from delays in defining the project list. Most of the extra definition has related to capital maintenance investment. Customers will rightly expect Scottish Water to have taken all possible steps to ensure that the investment programme is delivered efficiently and effectively.

The stakeholders agreed a solution to the issue of the £103 million spend to save expenditure included in the original WIC 18 in September 2004. This agreement allowed £58.12 million of the £103 million to be allocated to projects where the scope of the project had changed

⁶ This letter is published in Volume 1 of our methodology, 'Our work in regulating the Scottish water industry: Setting out a clear framework for the Strategic Review of Charges 2006-10' Appendix 2, Page 139.

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.

Stakeholders have now identified potential projects to satisfy the WIC 16 criteria⁷.

We are concerned that a complete baseline investment programme for *Quality and Standards II* has only just been agreed. It is now over three and a half years since we originally asked for project-specific information (through the WIC 18 letter), and we are now more than halfway through the four-year investment period. We believe that a properly defined baseline programme must be in place before the start of the next regulatory control period.

An example of the importance of clearly defined projects

The lack of a clearly defined investment programme for *Quality and Standards II* has had a significant impact on customers. A typical example of this planned improvements is on the Isle of Arran. The former West of Scotland Water Authority made a number of statements about improvements to the wastewater network on Arran. These included the intention to provide 'secondary' (biological) wastewater treatment.

Scottish Water has subsequently concluded that the required environmental standards can be met more effectively and efficiently through primary treatment, with longer sea outfalls. This has left a number of the residents of Arran dissatisfied with the revised scheme, which they believe has also limited the potential for development. In the absence of a defined investment programme, it has not proved possible to determine

whether the original wastewater scheme for Arran in *Quality and Standards II* included funding for growth.

7.3 Lessons learned from Quality and Standards II

The WIC 18 experience has taught us that a fully defined capital investment programme must be in place at the outset of the *Quality and Standards III* process. Our discussions with the Scottish Environment Protection Agency (SEPA) and the Drinking Water Quality Regulator DWQR also lead us to conclude that the outputs to be delivered by each project must be clearly defined and quantified at the outset of the process.

At the start of *Quality and Standards III* we made it clear that we would require a transparent and auditable investment programme. It is important to emphasise that a detailed baseline programme brings benefits for customers. Capital projects such as treatment plant upgrades or pipe renewal can have a major impact on customers and local communities, and customers have a right to know about projects that will have an impact on them.

We propose that the baseline investment programme should be published in full. If customers have been given assurances by Scottish Water that levels of service will be improved, they should be able to check if and when the particular project will be delivered. This would help ensure transparency and accountability in the delivery of agreed benefits to customers and to the environment.

There is also a need for a process that allows projects to be substituted for others. We have seen how, in *Quality and Standards II*, changing priorities, revised policies and practices, new technologies and new information may mean that outputs need to be amended.

It is likely that the *Quality and Standards II* substitution process will need to be developed further for *Quality and Standards III*. We will also need to address issues such as how the baseline investment programme, and changes to it, are communicated to customers and developers.

⁷ WIC 16: Development constraints and rural sewerage connections – 28 May 2001

7.4 Potential non-delivery of Quality and Standards II

In Chapter 6 we highlighted the challenge that Scottish Water faced in completing the investment programme on time. We wrote to Scottish Water at the start of September 2004, making the following points:

- as work was already underway on the *Strategic Review of Charges 2006-10*, it was important that we should complete the audit trail of the process by which the baseline programme for *Quality and Standards II* is established; and
- 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 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 the publication of our methodology for assessing capital efficiency until we received a proper and complete response. We received no response to this letter.

On 11 October 2004 we wrote a regulatory letter, WIC 47⁸, asking for a final version of the *Quality and Standards II* investment programme and a clear statement of the likely delivery position of the programme by the end of March 2006. We explained that specification of the baseline investment programme

for the second draft business plan would be difficult without this information.

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. These provided estimates of between £99 million and £180 million of non-delivery of the *Quality and Standards II* baseline programme by 1 April 2006.

We responded on 15 October 2004 and explained that we required 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 (submitted on 29 October 2004), Scottish Water indicated that its latest projection of the *Quality and Standards II* non-delivery has risen to £260 million. We are concerned by the lack of consistency in Scottish Water's estimates.

7.5 'Early start' programme

Scottish Water has proposed an 'early start' programme for *Quality and Standards III* in its first draft business plan. It argues that this would allow a smooth transition from one regulatory control period to the next, by allowing preparatory work to begin on *Quality and Standards III*.

In England and Wales, Ofwat has introduced an 'early start' programme. This was designed to avoid cyclical declines in capital investment delivery between regulatory control periods.

⁸ This letter is available on our web-site www.watercommissioner.co.uk

In practice, Ofwat has found that companies have asked for very limited 'early start' project funding.

Normally we would view an 'early start' approach as sensible, provided it is carefully monitored and the projects which are 'brought forward' into the current period are clearly identified in reporting.

However, given the delay in delivery of *Quality and Standards II*, we are concerned that an 'early start' programme would only represent a distraction for Scottish Water.

We would also be concerned that there may be a tendency for Scottish Water to seek to begin the relatively straightforward elements of the *Quality and Standards III* programme, such as mains renewal, and focus less on delivery of the generally more complex water quality and environmental programmes in *Quality and Standards II* and *III*.

We would therefore be minded to accept any proposals for an early start programme for *Quality and Standards III* only in the context of a detailed list of projects for both *Quality and Standards III* and any overhang from *Quality and Standards II*.

7.6 Summary

The process of establishing a baseline for *Quality and Standards II* has demonstrated that this must be addressed before the start of *Quality and Standards III*.

As we predicted in our *Investment and Asset Management Report 2002-06*, it seems increasingly likely that a significant proportion of *Quality and Standards II* will not be delivered on time. The delay in delivery of *Quality and Standards II* suggests that an 'early start' programme for *Quality and Standards III* is inappropriate until a full definition of any potential overhang is agreed.

7.7 Questions for consultation

1. Do respondents agree that, based on experience from *Quality and Standards II*, a baseline investment programme detailing, at a project level, the

deliverables from Scottish Water's capital expenditure is an essential pre-requisite for the *Strategic Review of Charges 2006-10*?

2. Do respondents think the investment programme should be published? If so, should it be published in full or should regional lists be provided?
3. Do respondents agree that an 'early start' programme for *Quality and Standards III* is not appropriate unless appropriate definition of the *Quality and Standards II* and *III* programmes is available?

Section 2: Chapter 8

Investment programme deliverability

8.1 Introduction

This chapter examines how deliverable the investment programme is likely to be, and how we would propose to take account of the size of the investment programme in setting efficiency targets. The efficient delivery of the investment programme is critical to ensuring that customers receive value for money from Scottish Water. If Scottish Water is required to deliver a very large programme, then the scope for efficiency may be reduced. The size of the programme that Scottish Water has to deliver will depend on the extent of the overhang from *Quality and Standards II* and on the investment priorities for *Quality and Standards III* that is outlined in Ministerial Guidance.

The chapter first reviews the information that is currently available about the likely overhang from *Quality and Standards II*, then considers the water industry investment programmes that have been delivered south of the border in the past. The chapter concludes by setting out our views on the maximum size of the efficient capital programme. It is our belief that if a higher number of outputs are required we will need to reduce the efficiency targets we set for Scottish Water.

8.2 Deliverability of Quality and Standards II

It appears increasingly likely that the *Quality and Standards II* investment programme will not have been delivered in full by April 2006. At the time of writing we have not been able to quantify the extent of *Quality and Standards II* that will remain undelivered. Our analysis of the first *Quality and Standards II* projects to have been completed also suggests that the capital efficiency targets set in the *Strategic Review of Charges 2002-06* may not be met.

If *Quality and Standards II* has not been delivered in full (either because budgets have not been spent in full or because investment has been delivered less efficiently than the targets set in the 2002-06 Review), the remaining outputs from this investment programme will have to be delivered during the period of the *Strategic Review of Charges 2006-10*. This will inevitably mean that less of the proposed *Quality and Standards III* investment programme can be delivered before 2010.

Our analysis has focused on the regulatory return that Scottish Water provides us each quarter. This details spending on each investment project in the agreed WIC18 baseline and any other capital spending. Such other capital expenditure could include spending on the *Quality and Standards I* overhang and non-core capital investment.

Establishing the baseline to be delivered

The value of WIC18 is £1,808 million. In the *Strategic Review of Charges 2002-06*, we assumed a rate of capital expenditure inflation of 1.5% a year. However, capital investment inflation has run at a higher level and this is likely to increase the efficient cost of delivering the WIC18 list of projects to approximately £1,930 million. Scottish Water has also been tasked with delivering a further £110 million of new outputs. These relate to security, the removal of hazardous substances and contributions to developers. This brings the total efficient cost of the programme to £2,040 million.

We have reviewed the quarterly Capital Investment Return that covers the period up to 30 September 2004. This review identified that a proportion of investment spending did not relate to projects from the WIC18 baseline. To the end of September, Scottish Water had invested £961 million, of which £693 million related to projects identified as *Quality and Standards II*. There was no expenditure relating to the agreed new outputs.

In our agreement with Scottish Water on the resolution of the spend-to-save included in the WIC18 baseline, we agreed that £47 million of *Quality and Standards I* overhang inherited by Scottish Water could be included in the WIC18 baseline. This increased the identifiable WIC18 investment spending to £740 million.

The current regulatory period ends in March 2006. This leaves 18 months before *Quality and Standards III* is scheduled to start. If Scottish Water were able to spend £344 million in the remainder of the current financial year and £590 million in 2005-06, this would imply a total *Quality and Standards II* investment spending of £1,674 million.

We have analysed the small proportion of the programme that has been completed to beneficial use¹. We concluded that Scottish Water has delivered this

¹ Beneficial use is the final stage of investment where the outputs begin to be delivered.

element of the investment programme inefficiently. In our analysis, we adjusted the pre-efficiency allowance for the completed projects to take account of the higher level of capital inflation and compared the cost of the projects with the 2002-03 efficiency target (the lowest of the four annual targets). This inefficiency amounts to £10 million.

This analysis suggested that a total of £1,664 million of *Quality and Standards II* outputs will have been delivered by the end of March 2006. This compares with a revised total investment programme of £2,040 million. Table 8.1 summarises the analysis.

Table 8.1: Analysis of likely Quality and Standards II overhang

Item	Quarterly Capital Investment Return analysis (£m)
<i>Quality and Standards II</i> spent to date (30/09/04)	693
Non-Quality and Standards II spent to date (30/09/04)	268
Total spending on investment	961
Check of Non-Quality and Standards II:	
Notified new outputs agreed (30/09/04)	0
Agreed <i>Quality and Standards I</i> carry-over into <i>Quality and Standards II</i> period (post-efficiency)	47
Total	47
Revised <i>Quality and Standards II</i> investment spending	740
Revised Non-Quality and Standards II	221
Total spending	961
Estimated maximum efficient investment spending for remainder of 2004-05	344
First half of 2004-05 investment spending	216
Total maximum estimated investment spending	560
Estimated maximum 2005-06 investment spending	590
Total expected <i>Quality and Standards II</i> investment spending (including new outputs)	1,674
Estimated inefficiency on completed projects	(10)
TOTAL EXPECTED QUALITY AND STANDARDS II OUTPUTS DELIVERED (INCLUDING NEW OUTPUTS) (a)	1,664
Baseline <i>Quality and Standards II</i> investment programme	1,810
Notified new outputs (WIC47)	110
Capital inflation above assumptions at Strategic Review of Charges	120
TOTAL REQUIRED INVESTMENT TO DELIVER OUTPUTS (b)	2,040
UNDELIVERED PORTION (b)-(a)	376

We outlined this analysis in our WIC51 letter to Scottish Water. Scottish Water has since substantially revised its regulatory return; however, our review of the new information did not change our view on the likely overhang. The revised information would imply that more of the money has been spent on *Quality and Standards II* projects; however, it appears likely that inefficiency will more than compensate for the extra *Quality and Standards II* money invested.

Determining the size of the overhang

We will continue to work with Scottish Water to understand the overhang from *Quality and Standards II* that will impact on the next regulatory control period. The output from this work will be a defined list of projects and status codes for the remainder of *Quality and Standards II*. This will need to be reconciled with the quarterly investment return for the period up to September 2004.

If we are unable to agree the overhang with Scottish Water, we will use the information available from regulatory returns to set a baseline for the remainder of the current regulatory control period. We will only recognise spending as efficient if it appears on our baseline of projects.

The Minister's Guidance for the next regulatory control period is due at the end of January 2005. We will have to establish our baseline of the remaining *Quality and Standards II* projects if we have not been able to reach agreement with Scottish Water by 28 January 2005.

When we have determined the size of the overhang we will consider the list of projects carefully to identify any further opportunities for synergies or other efficiencies. If we establish that there are such opportunities, we would propose to reduce the cash resources allowed to Scottish Water to complete the delivery of its outputs.

8.3 Size of the investment programme

The *Quality and Standards II* investment programme was approximately £1.9² billion over four years. This total investment is equivalent to £833 per household in Scotland.

It is instructive to examine the investment programmes that the companies in England and Wales have delivered over consecutive four-year periods. There are 17 such four-year periods for which investment has been delivered (or defined) since privatisation of the industry in 1989. To ensure that comparisons are made on a like-for-like basis, we have adjusted the size of the programme to take account of inflation. The following tables show the investment levels of each of the water and sewerage companies since privatisation.

² The original £1.81 billion investment programme included in the *Strategic Review of Charges 2002-06* increases to £1.93 billion as a result of higher than expected capital outputs inflation

Table 8.2: Investment per four-year period (£m)

Four-year Consecutive Period (£m)	1990-94	1991-95	1992-96	1993-97	1994-98	1995-99	1996-00	1997-01	1998-02	1999-03	2000-04	2001-05	2002-06	2003-07	2004-08	2005-09	2006-10
Anglian	1,829.0	1,856.0	1,722.0	1,676.9	1,599.4	1,574.1	1,600.2	1,465.1	1,315.1	1,199.6	1,105.4	1,098.2	1,083.4	1,069.0	1,042.2	1,013.0	988.3
Dwr Cymru	981.0	998.9	1,009.4	1,043.9	1,129.2	1,197.3	1,205.8	1,126.4	1,021.7	984.7	977.8	973.3	961.7	884.6	809.0	780.3	761.3
Northumbrian	523.6	482.3	470.7	525.6	705.9	815.9	958.1	989.9	905.7	912.3	831.8	745.0	694.6	629.2	586.6	585.0	570.8
Severn Trent	2,773.1	2,751.5	2,336.0	2,131.1	2,174.8	2,324.1	2,515.4	2,313.3	2,077.8	1,853.3	1,668.9	1,699.0	1,690.9	1,619.1	1,546.7	1,534.9	1,497.4
South West	944.8	975.3	870.7	789.8	715.2	632.7	647.2	619.8	604.0	673.5	666.1	643.1	606.2	555.2	548.3	535.9	522.8
Southern	749.6	759.9	713.3	787.5	918.6	1,099.8	1,295.4	1,380.1	1,306.9	1,156.6	981.9	885.0	907.1	948.7	1,020.9	1,065.8	1,039.8
Thames	2,200.9	2,031.4	1,912.3	1,907.0	1,982.6	2,132.2	2,197.6	2,049.1	1,915.9	1,911.5	1,992.1	2,038.3	2,100.0	2,038.4	1,923.5	1,974.6	1,926.4
United Utilities	2,439.0	2,331.2	2,174.3	2,133.1	2,160.4	2,274.3	2,270.7	2,070.9	1,927.6	1,953.3	2,286.3	2,480.9	2,509.3	2,353.1	1,929.1	1,766.1	1,723.0
Wessex	645.7	623.6	543.5	487.0	484.8	530.2	575.4	595.0	594.9	608.5	627.3	640.2	631.7	593.3	554.4	533.6	520.6
Yorkshire	1,411.5	1,294.5	1,183.4	1,207.3	1,322.4	1,517.5	1,727.2	1,584.5	1,522.3	1,425.3	1,231.8	1,236.3	1,158.6	1,084.1	1,031.2	984.4	960.3

Table 8.3: Investment per connected property (£m)

Four-year Consecutive Period (£m)	1990-94	1991-95	1992-96	1993-97	1994-98	1995-99	1996-00	1997-01	1998-02	1999-03	2000-04	2001-05	2002-06	2003-07	2004-08	2005-09	2006-10
Anglian	745.2	756.2	701.6	683.2	651.6	641.3	651.9	596.9	535.8	488.7	450.3	447.4	441.4	435.5	424.6	412.7	402.6
Dwr Cymru	746.4	760.1	768.0	794.2	859.2	911.0	917.4	857.1	777.4	749.2	743.9	740.6	731.7	673.0	615.5	593.7	579.2
Northumbrian	280.5	258.4	252.2	281.6	378.2	437.1	513.3	530.3	485.2	488.7	445.6	399.1	372.1	337.1	314.2	313.4	305.8
Severn Trent	744.5	738.7	627.1	572.1	583.8	623.9	675.3	621.0	557.8	497.5	448.0	456.1	453.9	434.6	415.2	412.0	402.0
South West	1,274.6	1,315.8	1,174.6	1,065.5	964.8	853.5	873.1	836.1	814.8	908.5	898.6	867.6	817.8	749.0	739.6	722.9	705.3
Southern	411.9	417.6	391.9	432.7	504.8	604.3	711.8	758.3	718.1	635.5	539.5	486.3	498.5	521.3	561.0	585.7	571.4
Thames	407.9	376.5	354.4	353.5	367.5	395.2	407.3	379.8	355.1	354.3	369.2	377.8	389.2	377.8	356.5	366.0	357.1
United Utilities	816.3	780.2	727.7	713.9	723.0	761.2	760.0	693.1	645.1	653.7	765.2	830.3	839.8	787.6	645.6	591.1	576.7
Wessex	588.9	568.7	495.7	444.2	442.2	483.6	524.8	542.7	542.6	555.0	572.1	583.9	576.1	541.1	505.7	486.7	474.9
Yorkshire	683.0	626.4	572.6	584.2	639.9	734.3	835.7	766.7	736.6	689.7	596.0	598.2	560.6	524.6	499.0	476.3	464.7

By drawing comparisons with the programmes south of the border, it is clear that the *Quality and Standards II* investment programme represented a significant challenge for the three former authorities. This challenge was made more demanding by the merger of the three former authorities and the need to improve significantly the efficiency of capital investment delivery.

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; Anglian Water and Yorkshire Water are similar in size to Scottish Water.

The following table compares the size of programmes delivered or defined by the companies with the *Quality and Standards II* programme.

Table 8.4: Summary of relative size of Quality and Standards II

	Largest four-year programme	Median four-year programme	Largest four-year programme per connected property
Thames	£2,200m	£1,992m	£540
Severn Trent	£2,773m	£2,078m	£782
United Utilities	£2,509m	£2,174m	£849
Anglian	£1,856m	£1,315m	£841
Yorkshire	£1,727m	£1,236m	£838
Quality and Standards II	£1,930m ³		£833

This shows that *Quality and Standards II* was a very large investment programme. It was larger than the largest programme ever delivered by Anglian Water and Yorkshire Water (the two companies of similar size to Scottish Water). It is also very large in terms of investment per connected property.

³ See footnote 1.

South West Water and Welsh Water have both delivered capital programmes that are very large relative to the areas they cover. This is summarised in Table 8.5.

Table 8.5: Comparison of relative size of Quality and Standards II on a per connected property basis

Company	Number of connected properties	Largest four-year programme	Median four-year programme	Largest four-year programme per connected property
South West Water	0.74 m	£975m	£673m	£1,316
Welsh Water	1.31 m	£1,206m	£1,022m	£917
Wessex Water	1.10 m	£646m	£595m	£589
Northumbrian Water	1.87 m	£990m	£816m	£530
Quality and Standards II	2.32 m	£1,930m ⁴		£833

Even though Scottish Water's programme is much larger than the programmes of these other smaller companies, it is still significant on a per connected property basis. It does however seem more straightforward for a smaller organisation to deliver capital expenditure.

Scottish Water's first draft business plan

In its first draft business plan, Scottish Water proposed that it should deliver a *Quality and Standards III* investment programme of approximately £2.2 billion during the next regulatory control period. This was in addition to approximately £260 million of *Quality and Standards II* that would not have been spent. This would equate to a total investment programme of some £615 million per year, or £2.46 billion over the four-year regulatory control period. This is equivalent to more than £1,000 per connected property.

Table 8.4 illustrated that only two of the largest companies south of the border have ever delivered more extensive investment programmes than that which is now proposed by Scottish Water. It is also useful to note that neither of these companies has ever delivered a four-year investment programme of more than £850 per connected property.

The extent of the challenge that Scottish Water sets itself in its first draft business plan is demonstrated in Table 8.6. This shows the frequency with which the five

largest companies south of the border have delivered four-year investment programmes of more than £1.6 billion.

Table 8.6: Delivery of programmes of more than £1.6 billion

Size of four-year investment programme	Size of programme per year	Number of occasions	Cumulative %
Over £2.6 billion	£650m	2	2.4
Over £2.5 billion	£625m	4	4.7
Over £2.4 billion	£600m	6	7.1
Over £2.3 billion	£575m	11	12.9
Over £2.2 billion	£550m	15	17.6
Over £2.1 billion	£525m	23	27.1
Over £2.0 billion	£500m	29	34.1
Over £1.9 billion	£475m	41	48.2
Over £1.8 billion	£450m	44	51.8
Over £1.7 billion	£425m	48	56.5
Over £1.6 billion	£400m	54	63.5
Under £1.6 billion	£400m	31	100.0

This reveals that Scottish Water's proposed investment programme is almost without precedent in the recent history of the water and sewerage industry in the UK. The privatised companies have delivered programmes of more than £2.4 billion on only six occasions, or 7.1% of all of the possible four-year periods. None of these larger investment programmes has been delivered recently, nor was it as large as the proposed programme of Scottish Water on a per connected property basis.

8.4 Maximum efficient size of a capital investment programme in Scotland

If the investment programme is set at a level that is too ambitious, there is a significant risk that it will not be delivered in full or that it will be delivered inefficiently. In the first case, Scottish Water would not require the full public expenditure that Ministers make available. This is likely to have implications for the balance of Scottish Water's funding that comes from debt and that which comes from customers' charges. This would reduce the debt to RCV ratio. In the latter case, there is a chance either that some outputs are not delivered or that further public expenditure is required in order to ensure that the outputs required are delivered in full. We discussed RCV in Volume 3.

⁴ See footnote 1.

The analysis that we have presented concerning delivery of capital programmes south of the border suggests that any significant increase in the *Quality and Standards II* investment programme is likely to increase the risk that the desired investment programme will not be delivered.

The evidence from *Quality and Standards II* is not wholly encouraging. While there does appear to have been a marked acceleration of the capital programme after the appointment of Scottish Water Solutions, a capital programme in excess of £2.0 billion still seems ambitious. Such a programme has been delivered only relatively rarely.

Ofwat has reported that the companies south of the border have achieved significant improvements in their capital expenditure efficiency over the last ten years. It seems that these improvements have been achieved at a time when the companies were required to deliver slightly smaller, although still significant, investment programmes.

At this time we would suggest that £2.1 billion (including the *Quality and Standards II* overhang) would be a relatively optimistic maximum for the capital investment programme for the next regulatory control period. We believe that if Ministers tasked the industry with delivering a much higher level of investment (post-efficiency) than this, then we may have to reduce our efficiency targets. This would adversely impact on customers' bills and may actually lead to fewer outputs being delivered.

It may, however, be possible to reduce the potential organisational bottlenecks to investment delivery. This could mean that a larger programme was deliverable.

We propose to review the available evidence to establish whether there is any reliable correlation between the size of the programme and the efficiency of the companies south of the border. This analysis will inform our *Strategic Review of Charges 2006-10*.

8.5 Conclusion

The *Quality and Standards II* investment programme represented a considerable challenge. It was a larger investment programme than has ever been delivered by companies of a similar size to Scottish Water. Moreover, Scottish Water was tasked with a significant improvement in capital expenditure efficiency. It appears likely that there will be a substantial overhang from *Quality and Standards II* into the next regulatory control period. This overhang is likely to place a limit on the *Quality and Standards III* outputs that can be delivered during this time.

We believe that it is important that we learn from this experience by setting a capital programme that can be delivered efficiently. This is in the longer term interests of customers, the environment and public health.

8.6 Questions for consultation

1. How do respondents believe we should treat the potential overhang from *Quality and Standards II*?
2. Should we learn from this experience in setting the investment programme for the next regulatory control period?
3. What factors should we take into account in establishing the deliverability of the investment programme?
4. Should we adjust the efficiency target if the proposed investment programme is very large?

Section 2: Chapter 9

Defining the investment programme

9.1 Introduction

In Chapter 7 we described the progress we had made in establishing a baseline for the investment programme at the last Strategic Review of Charges. We also discussed the lessons that we have learned from that process. In this chapter we outline the process we propose to adopt in setting a capital investment baseline for the next regulatory control period 2006-10. This process takes full account of experience gained during the current regulatory control period.

This chapter sets out our requirements for the investment plan element of Scottish Water's second draft business plan. We explain that this level of detail is in the interests of all stakeholders, including Scottish Water. Our requirements for the investment plan are broadly consistent with those that are required by Ofwat for the companies south of the border.

The chapter closes by reviewing the timetable for the second draft business plan of Scottish Water and the role of the Reporter in auditing the investment plan.

9.2 Requirements for the baseline capital investment programme

We issued guidance to Scottish Water concerning its second draft business plan on 8 December 2004. Our information requirement for the capital investment programme for 2006-10 is central to that guidance.

A baseline for the capital investment programme is the agreed detailed list of capital projects that Scottish Water will deliver during the next regulatory control period. It is a key part of the regulatory contract between Scottish Water and its customers. The investment plan must be consistent with ministerial guidance¹. This guidance will set out the Scottish Executive's detailed investment priorities.

The baseline investment programme should be clear, comprehensive and accessible. This will allow

stakeholders to monitor Scottish Water's progress in delivering the investment programme. It will also ensure that stakeholders' expectations are met

In Chapter 2 we explained that the investment programme can be split into three main elements:

- capital maintenance;
- quality; and
- supply/demand.

Quality projects are agreed with the Scottish Environment Protection Agency (SEPA) and the Drinking Water Quality Regulator (DWQR). In Quality and Standards II there were around:

- 2,500 capital maintenance projects;
- 1,200 quality investment projects; and
- fewer than 100 supply/demand projects.

The level of definition that is possible for each of these three elements varies. Some projects can be specified in advance, while others may be more reactive². Capital maintenance projects tend to be more difficult to define than quality investment projects.

Our requirements for the investment programme baseline include the following elements:

A detailed list of projects

We require a detailed list of all of the quality projects and supply/demand projects. The detailed list should also include all capital maintenance projects that have a value of more than £250,000.

Each investment project should have:

- a unique code;

¹ Initial guidance was provided by the Minister for Environment and Rural Development, Ross Finnie MSP, in a letter to the Chairman of Scottish Water and the Water Industry Commissioner dated 26 May 2004. Further guidance is expected in January 2005.

² Reactive projects are those associated with operational needs which arise at short notice: for example, replacing a piece of plant or section of pipe which has failed unexpectedly or where operational performance has declined over a short period of time.

- unique name; and
- a geographical reference (place name and water supply zone/drainage area).

Capital maintenance expenditure of less than £250,000 does not need to be defined at a project level, but has to be grouped into broad output categories.

Such clear definition ensures that stakeholders can examine the status of a given project and track its progress.

Defined outputs for each individual project

All projects should have pre-agreed, defined and discrete outputs. This ensures that all planned investment outputs are covered within discrete, single projects.

Scottish Water's investment plan is likely to be complex and large. Stakeholders will want to ensure that projects to address a particular local need are clearly identifiable in the baseline. By requiring clear links between outputs and individual projects we should avoid overlap between projects in Scottish Water's baseline.

Clear definition of capital maintenance

All capital maintenance projects should identify clearly:

- the work proposed (its size, quantity and type); and
- whether the project is planned or reactive; and
- the cost.

We need to ensure that adequate funds are available for maintenance, and that we can monitor Scottish Water's progress in maintaining its assets. By asking for details of the proposed maintenance work and its cost, we expect to ensure that funding from customers is adequate and is used for the purpose intended.

Clear definition of the outputs of planned maintenance

This should include the following elements:

- an appropriate measure of the output (for example the length of main relined), and
- the number of units of that measure that the project delivers (for example five km).

We will monitor outputs and spending to ensure that Scottish Water uses capital maintenance investment appropriately and delivers anticipated benefits to customers.

Definition of quality and supply/demand drivers and costs

Quality and supply/demand activity should be clearly identified and costed.

This should include:

- information about which agreed 'drivers' are generating the project; and
- an allocation of costs to the main drivers.

Definition of quality and supply/demand outputs

This should include:

- an appropriate measure of the output (for example, the volume of water delivered to customers that will become compliant with the required standard as a result, or the population that will benefit from improvements at a sewage treatment works to meet environmental standards); and
- the number of units of that measure that the project delivers.

This information will provide stakeholders with a clear list of the benefits of the agreed investment programme. It also allows stakeholders to monitor progress towards delivery of those outputs.

Clear allocation of costs to drivers

Each specified project requires:

- a primary driver of a project;
- a clear statement of any secondary drivers that may influence the scale and nature of the project; and
- the allocation of project expenditure to the primary and secondary drivers.

This enables stakeholders to understand the costs of meeting different investment objectives.

Separation of capital maintenance and other investment drivers costs

We expect the costs of quality enhancements or supply/demand expenditure to be reflected only in the marginal extra cost after the cost of any maintenance activity that is already planned at the asset.

This will ensure that we can distinguish between maintenance and other costs.

Profile of project delivery

The timetable for the delivery of projects should include:

- annual projected investment spend for each project – this should include any expenditure either before or after the regulatory control period;
- identification of key project milestones (for example when planning consent is granted); and
- the expected completion date of the project.

This helps us to monitor progress in the delivery of projects, both in terms of time (ie, is the project delayed?) and spend (ie, is spending above or below the expected amount?).

Similar information for all projects included in overhang from Quality and Standards II

It appears likely that the *Quality and Standards II* investment programme will not have been delivered in full by April 2006. Our analysis of the first *Quality and*

Standards II projects that have been completed also suggests that the capital efficiency targets set in the *Strategic Review of Charges 2002-06* may not be met. Any remaining outputs from the *Quality and Standards II* programme will have to be delivered during the 2006-10 regulatory control period. This will mean that less of the proposed *Quality and Standards III* investment programme can be delivered before 2010. It is therefore critical that we have a complete and detailed list of those elements of *Quality and Standards II* that remain to be delivered.

The detailed format for the investment baseline is reproduced in Appendix 1.

9.3 The benefits of our proposed approach to establishing the baseline

We believe that, although detailed, the definition of the capital programme that we require is proportionate. It is in the interests of all stakeholders, including Scottish Water, that the investment programme is clearly defined. This definition must be sufficient to minimise future disagreements about the scope or scale of the agreed investment programme.

Meeting the needs of customers and stakeholders

We have discussed the information requirements of the baseline capital investment programme with SEPA and the DWQR. They have specific needs which we have incorporated into the baseline so that they can monitor the delivery of outputs expected by Ministers. Such project-specific information is required to ensure that the appropriate drinking water quality and environmental standards are met.

Customers will also expect to be able to assess whether projects are delivered on time. This is particularly important where projects have a direct impact on the local service that customers receive.

Both customers and stakeholders will expect investment to be delivered as efficiently as possible. This should increase the extent of improvements in levels of service to customers and the environment that Scottish Water can deliver.

The baseline must contain clear and detailed information about project outputs, timeframes for delivery, and costs if it is to meet the needs of stakeholders.

The requirement for inputs and outputs to be monitored

We are proposing to monitor both inputs and outputs. By inputs we mean the list of investment projects that Scottish Water plans to undertake. By outputs we mean desired outcomes such as cleaner beaches, better water quality and improved customer service.

Ideally, we would wish to restrict our monitoring to outputs alone, but this is likely to increase the scope for disputes about whether or not the investment programme has been delivered. As such, we believe that the customer interest is best served by requiring Scottish Water to deliver an agreed list of inputs.

Consistency of cost estimates with Scottish Water's cost base

In Chapter 11 we describe Ofwat's cost base approach to comparing capital procurement costs for a set of standardised projects. We propose to adopt this approach in assessing Scottish Water's relative procurement efficiency.

We will therefore need to ensure that the cost estimates in Scottish Water's investment programme are fully consistent with the information contained in Scottish Water's cost base. The detailed list of investment projects and their costs will allow us to check the consistency of the cost base and the costs of the investment projects.

The proportionality of our proposed approach

Capital investment is the single largest component of Scottish Water's expenditure. In recent years, capital investment in the Scottish water industry has ranged from £360 million to £460 million a year. It is reasonable for customers and stakeholders to expect clear information about when the benefits of investment will be delivered.

We accept that it may not be practical for Scottish Water to provide detailed information about its entire programme, as some capital maintenance activity is reactive. For example, if a major sewer collapses then capital maintenance would be required to fix it; clearly, however, the location and nature of this work could not have been known in advance. In such circumstances, we expect Scottish Water to assess the expected level of reactive capital maintenance and to break it down both into categories of spend and into geographical areas, with appropriate justifications. This information will allow us to monitor this type of capital investment and to draw comparisons with England and Wales.

We have attempted to strike a balance between the needs of stakeholders and the reporting burden on Scottish Water. We believe that by allowing Scottish Water to combine very small capital maintenance projects for reporting purposes, we have significantly reduced Scottish Water's information burden, without compromising the benefits of the investment programme baseline.

9.4 Ofwat's information requirements

We believe that our information requirements are very similar in scope and content to those that are required by Ofwat for the companies in England and Wales. This reinforces our view that our information request is proportionate.

For its 2004 price review, Ofwat initially required companies to submit detailed investment plans (for water and wastewater). The companies were required to submit three versions of their investment plans – 'Reference plan A', 'Reference plan B' and a preferred strategy. The reference plans looked at specified quality improvements with reference level assumptions for certain key issues. These were provided to help inform ministerial guidance to Ofwat, the Environment Agency, and the Drinking Water Inspectorate.

Ofwat required the companies to include the following information in their investment plans:

- the specific legal obligation (for quality projects) or the reason the changes or work on the assets is required

(for other cost categories) explained with reference to cost drivers;

- the asset improvement(s) associated with the investment;
- the measurable output(s) or activity that will be delivered (for quality and where applicable for other projects);
- the due or expected dates for completion or delivery;
- milestone dates for significant projects (ie those with a capital value in excess of 1% of the service turnover);
- the profile of the capital expenditure and additional operating costs; and
- the defined geographical area for work on infrastructure or benefiting from work on non-infrastructure assets.

Companies provided this information on a project-by-project basis, but could combine projects of a value of less than £250,000 in a defined geographic area. Ofwat defined geographic areas as:

- water supply zones (for drinking water quality);
- water resource zones (for supply/demand, security of supply and environmental impact);
- distribution zone study areas (for any work on the distribution system, including infrastructure renewals and quality related work); and
- sewerage drainage areas (all sewerage service projects).

Ofwat required companies to allocate costs proportionally across drivers. Environmental drivers were initially ranked by the Environment Agency, and for these drivers companies were then asked to first assign costs to the highest ranked driver. The costs assigned to the next highest ranked driver were then the net additional costs of delivering these improvements over

and above those delivered by the highest ranked driver. This system of cost allocation continued for as many drivers as were identified for each project. Companies were also required to identify and allocate maintenance and growth costs of quality enhancement projects.

The companies submitted their final plans with their second draft business plans in April 2004.

9.5 The process for defining the baseline investment programme

Scottish Water submitted its first draft business plan on 29 October 2004. This plan contained its initial investment plan proposals, based on the expected outcome from *Quality and Standards III*. We reviewed these proposals and published our response on 3 December 2004.

Scottish Water's second draft business plan is due to be submitted to us on 20 April 2005. This will contain an updated version of Scottish Water's proposed investment plan. In particular, this second plan should be fully consistent with Ministers' guidance.

We expect that this guidance will include:

- the extent of investment that Scottish Ministers consider desirable given the need to ensure both that the investment can be delivered in the four-year period and that it represents value for money;
- the required output, in terms of the performance of the network, from capital maintenance activity;
- the required improvement in the level of service provided to customers (this includes issues such as water pressure, sewer flooding and odour control);
- the outputs required from investment to improve water quality;
- the outputs required from investment to improve the environment;
- how currently perceived or actual constraints on development (both for housing and business) should be addressed; and

- whether, and, if so, with what priority requests for first time connection to the public water and sewerage system should be met.

Our guidance for the second draft business plan was issued on 8 December 2004. The format for the investment plan is attached at Appendix 1.

Scottish Water is required to submit detailed information to support its planned investment programme. We will ask the Reporter to carry out a detailed review of Scottish Water's investment programme, with particular emphasis on:

- an audit and challenge of the scope of requirements;
- an audit and challenge on the technical solutions proposed;
- an audit and challenge of the basis of cost estimates and their consistency with Scottish Water's cost base and;
- commentary on the overall size of the proposed programme.

We will ask the Reporter to draw on his experience with other companies in carrying out this review. In the next chapter, we set out how the Reporter's work will help us to finalise the baseline investment programme.

9.6 Summary

We have set out in this chapter the level of definition that we propose to use in specifying the baseline investment programme for the *Strategic Review of Charges 2006-10*.

The level of detail required is consistent both with the lessons learned from *Quality and Standards II* and the reporting burden on the companies in England and Wales.

9.7 Questions for consultation

1. Is the proposed degree of definition for the baseline investment programme sufficient?
2. If not, what other information should be captured, and why?
3. Would respondents agree with the rationale given in this chapter for the extent of definition of the baseline investment programme? In particular, is the reporting burden on Scottish Water appropriate?

Section 2: Chapter 10

Investment programme review

10.1 Introduction

In Chapters 7 and 9 we explained the importance we attach to ensuring that there is a fully defined capital investment programme for the *Strategic Review of Charges 2006-10*. This chapter explains how we will review the draft investment programme and finalise the baseline investment programme.

The chapter first outlines why we consider that it is necessary to review the investment programme. In particular, we explain how the review process will ensure that the proposed investment programme is consistent with ministerial guidance.

The chapter continues with a discussion of the techniques used by other regulators to review the draft investment programmes that regulated companies provide. We discuss the suitability of these approaches for the Scottish water industry, then outline our proposed approach to reviewing Scottish Water's investment programme. This chapter explains how we propose to work closely with the Reporter, the Scottish Environment Protection Agency (SEPA) and the Drinking Water Quality Regulator (DWQR), and why their involvement is critical to ensuring a thorough review of the investment programme.

Programme review is the first step in ensuring that Scottish Water's capital investment proposals meet the requirements of stakeholders and provide value for money for customers. It ensures that the scope of the proposals is appropriate to achieve the objectives set out by Ministers, and that the proposed expenditure is being effectively targeted.

10.2 The importance of reviewing the proposed investment programme

The guidance from the Scottish Ministers is likely to be at a relatively high level; it is likely to include objectives relating to meeting the requirements of water quality and environmental legislation, providing improved customer service and ensuring adequate levels of network maintenance.

Scottish Water will be required to translate this set of objectives into a fully defined, project-level investment programme in its second draft business plan. We intend to review Scottish Water's proposals to ensure that they meet the required objectives in the most effective way possible. This will help ensure that costs to customers are minimised and that stakeholders' requirements are met.

Our review of the investment programme is designed to ensure that it is effective and that it meets the requirements which have been set out in the ministerial guidance. It is important to make sure that the programme delivers the outputs and objectives set by the industry stakeholders. It will also be important to identify and remove any outputs that are not consistent with the Ministers' guidance.

If we do not first establish that the programme will deliver the agreed outputs effectively, the efficiency analysis that we undertake would be compromised. There is no point in delivering an ineffective investment plan efficiently.

In assessing the effectiveness of the investment programme, we will be looking to establish the following:

- Does the programme meet the objectives set out in Ministerial Guidance?
- Does it meet these objectives in the most effective way possible?
- Are stakeholders content that the proposed programme delivers the agreed objectives in an effective way?
- Is any of the proposed investment associated with outputs which lie outwith the requirements of the investment period?
- Are the proposed timescales for delivering the investment realistic?

10.3 How other regulators review and verify investment proposals

Industries with relatively large capital investment programmes, such as water and rail, are subjected to a higher degree of regulatory scrutiny of investment proposals than other regulated industries. Significant capital expenditure necessitates a detailed understanding of the way in which investment is prioritised and targeted.

In this section we discuss the approaches to verifying investment programmes that are used by the Office of the Rail Regulator (ORR), (from Summer 2004, the ORR became the Office of Rail Regulation), and Ofwat.

Office of the Rail Regulator

In December 2003, the ORR published its final conclusions on its 'Access charges review'. This periodic review determines the access charges that the train operating companies are required to pay to Network Rail as the owner and operator of the rail network.

A critical part of the access charges review was the ORR's analysis of Network Rail's requirements for capital investment in the areas of network maintenance and renewals for the period 2004-09. There were two elements to this analysis:

- a review of Network Rail's proposed network maintenance and renewals activity levels; and
- a review of the unit costs associated with this network maintenance and renewals activity.

Network Rail's allowed revenue for the maintenance and renewals programme was affected by both of these elements. In its business plan, Network Rail had put forward plans to carry out more maintenance and renewals activity than its predecessor, Railtrack, had thought was necessary. The proposed activity levels were also higher than ORR itself had assumed in the 2000 access charges review. As a result, ORR took the view that before applying efficiency to the programme, it would be sensible to review the assumptions underpinning Network Rail's proposed activity levels. In

other words, ORR wished to ensure that the programme of work proposed by Network Rail was robust.

Network Rail's work programme forecasts were divided into two parts:

- For the first two years (2004-05 and 2005-06), the work programme was based on proposals for actual physical work; and
- For the remaining three years (2006-07, 2007-08 and 2008-09), the work programme was derived from forecasting models, which incorporated a number of assumptions.

ORR carried out a detailed project level review of the work proposed for the first two years. For the remaining three years, ORR focussed on the modelling assumptions that Network Rail had used in its forecasts. In carrying out all of this work, ORR used consultancy expertise including Halcrow, TTCl and L.E.K. The ORR also consulted with stakeholders such as the Strategic Rail Authority and the Health and Safety Executive. The results of the review of activity levels are shown in Table 10.1.

Table 10.1: Impact of ORR's capital programme verification

	2004-05	2005-06	2006-07	2007-08	2008-09
Network Rail's business plan projections	£4,043m	£4,534m	£5,469m	£5,423m	£5,333m
ORR projected savings	£640m	£945m	£1,637m	£1,439m	£1,484m
Reduced programme	£3,403m	£3,589m	£3,832m	£3,984m	£3,849m
Reduction	-16%	-21%	-30%	-27%	-28%

ORR applied efficiency targets to the reduced investment programme.

This two-stage process, involving programme verification then an efficiency assessment, is consistent with our proposals for Scottish Water.

Office of Water Services

Ofwat carries out a similar review of the companies' capital investment programmes before it applies its

capital efficiency targets. In its final determinations¹ of price limits for the companies south of the border, Ofwat noted that it had included in price limits either in full or in part, most of the quality and environmental schemes that companies had put forward in their business plans. This refers to the number, not the cost, of schemes put forward by the companies. Table 10.2 indicates the impact on costs of Ofwat's review of the investment programme.

Table 10.2: Impact of Ofwat's capital programme verification

Companies' business plans – gross costs	Ofwat's assumptions – gross costs	Difference in costs	Difference in costs
£7,080m	£6,068m	£1,012m	14%

Ofwat reduced the costs associated with the companies' maintenance, quality, environmental and customer service improvements by around 14%, before applying any efficiency targets.

It set out clear criteria by which it would assess whether projects and costs should be included in the capital investment programme. To be included, all proposals had to meet the following criteria²:

- “they are required by the quality regulators, and confirmed by Ministers, or are new obligations under current legislation;
- they deliver a measurable defined output, which is enforceable;
- they have a clearly defined timetable and due date for delivery in line with regulations or other legislation;
- they have defined asset improvements or changes to operational procedures to deliver the output; and
- they have identified costs for the proposed solution which must have been challenged and validated by the company's Reporter.”

This approach is similar to that which Ofwat adopted at the 1999 price review. At that time a similar review of the companies' business plans led to an initial reduction in the investment plans of more than 10%.

10.4 Our proposed approach to reviewing the investment programme

Our aim is to ensure that customers and stakeholders receive the maximum possible benefit from Scottish Water's capital investment.

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 therefore propose to work with the Reporter, SEPA and DWQR to review Scottish Water's investment.

We would look for their assurance that the 'quality' element of Scottish Water's investment proposals meets the objectives outlined in the Ministerial Guidance. This may identify scope for new projects to be added to the agreed investment programme.

It will also be important to establish that the programme meets the needs of customers and other stakeholders. We need to be assured that the proposed investment is consistent with the capital maintenance objectives set out in the Ministerial Guidance and will deliver the required improvements in customer service, water quality and environmental performance.

The use of the Reporter would also be consistent with practice in England and Wales. We propose to provide guidance to the Reporter on requirements for this review. We will ask the Reporter to work with SEPA and DWQR to confirm that Ministers' water quality and environmental objectives will be met by the proposed investment programme. We would also expect the Reporter to highlight any areas where we may need to seek further advice on the appropriateness of proposed investment projects.

¹ Ofwat, *Future water and sewerage charges 2005-10: Final determinations*, December 2004.

² *Ibid*, pp192.

10.5 Review of the investment plan

We propose to use the following criteria in our review of the investment programme:

- Is the programme sufficiently defined to allow customers and stakeholders to monitor delivery? In particular, does it meet the level of definition set out in our guidelines³?
- 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 DWQR, agree that the relevant quality objectives will be met by the proposed investment?
- Are there projects in the programme which do not contribute to the required objectives?
- 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 the projects in the programme been allocated measurable, defined outputs?
- Do the projects have clearly defined delivery dates?
- Are the delivery dates realistic, both in terms of individual project construction times and the overall industry capacity to deliver the programme efficiently?

The process of reviewing the investment programme will provide us with an indication of areas where there is

scope to reduce or increase the outputs required from Scottish Water.

The output from the review should be a properly costed, fully defined list of capital investment projects, which, if delivered in full, will meet the objectives set out by Ministers for the regulatory control period.

10.6 Summary

The review of the proposed investment programme is a key step in ensuring that Scottish Water's capital investment proposals meet the requirements of stakeholders and represent value for money for customers.

Other regulators also review companies' capital expenditure proposals. We propose to use the Reporter to carry out this review. This is consistent with the approach adopted by Ofwat.

This review may lead us to seek modifications to Scottish Water's capital expenditure proposals. The revised programme will then form the baseline to which we can apply targets for capital efficiency.

10.7 Questions for consultation

1. Do respondents agree with our proposed use of the Reporter to carry out the process of verifying Scottish Water's capital investment proposals? If not, which other party do you think should be used for this exercise and why?
2. Do respondents have comments on our proposed programme review process?
3. Does it meet the needs of customers and stakeholders?
4. Are the proposed areas of assessment sufficient to ensure that the programme is deliverable, takes full account of potential synergies and will meet the objectives set out by Ministers?

³ See Chapter 9.

Section 3: Chapter 11

How Ofwat assesses capital expenditure efficiency

11.1 Introduction

In previous chapters we discussed our proposals to establish an effective baseline for the capital investment programme. In this chapter we examine different ways to assess the scope for capital efficiency. By capital efficiency we mean the scope for delivering the same set of objectives from the investment programme, but for less money.

In this chapter we explain how Ofwat establishes the scope for capital efficiency for the companies in England and Wales. Capital efficiency can be achieved in a number of ways, including improved strategic and project planning, better procurement and the use of innovative techniques. Inefficient spending results in higher bills and/or reduced outputs. Customers will expect Scottish Water to deliver its agreed investment programme.

The methods that Ofwat uses have been developed over a number of years and are used in the price setting process south of the border. We have used Ofwat's methods to monitor Scottish Water's progress towards achieving the efficiency targets set in the *Strategic Review of Charges 2002-06*. We report on Scottish Water's performance on capital efficiency in our Costs and Performance Reports¹.

This chapter considers the current methods that Ofwat uses and their possible application in Scotland. It includes:

- how capital efficiency assessment fits into Ofwat's overall framework for assessing the companies requirements for capital expenditure;
- what we mean by benchmarking;
- the Ofwat methods of benchmarking; and
- how Ofwat's methods might be applied to the water industry in Scotland.

It is important that the methods we use to assess capital expenditure efficiency are robust. The impact of efficiency targets can be significant. For example, in the *Strategic Review of Charges 2002-06* we set Scottish Water a target of delivering the *Quality and Standards II* programme for £500 million less than the cost estimated by the three former authorities. We have reviewed the methods used by Ofwat and other regulators to ensure that we use an appropriate approach in the *Strategic Review of Charges 2006-10*.

11.2 Ofwat's approach to assessing capital expenditure requirements

Ofwat adopt a four-stage approach to determining the capital expenditure requirements of the companies in England and Wales. The assessment of the scope for capital efficiency is the third of the four stages. Ofwat adopts different approaches for capital maintenance expenditure and for capital enhancement expenditure.

Capital maintenance

Ofwat employs a four-stage approach linked to the UKWIR common framework for capital maintenance planning². The overall aim of this approach is to ensure that the companies maintain their assets in such a way that appropriate levels of customer service and environmental performance are achieved over the long term. Performance is measured by Ofwat's 'serviceability indicators'.

The four stages of Ofwat's approach are:

- Stage A: Maintaining serviceability to customers to date
- Stage B: Is the future period different?
- Stage C: Scope for improvements in efficiency
- Stage D: Impact of the enhancement programmes

¹ *Costs and Performance Reports 2001-02* and *2002-03* published by this Office and available on our website at www.watercommissioner.co.uk

² See Chapter 3 of this document for details of the UKWIR capital maintenance common framework approach.

We described Stages A, B and D of Ofwat's approach, and the UKWIR common framework, in Chapter 3 when we considered the scope for efficiency in capital maintenance. Our focus in this chapter is on Stage C of Ofwat's approach.

Quality investment

Ofwat uses a two stage approach in determining the scope for efficiency in the delivery of the quality investment programme. The first stage of Ofwat's approach is a detailed review of the investment programme to ensure that the objectives set by Ministers and the appropriate quality regulators will be met. We described Ofwat's review of the investment programme in the previous chapter. Ofwat then uses 'benchmarking' techniques to assess the scope for improvements in capital enhancement expenditure efficiency for each company.

Benchmarking

Benchmarking is the process of comparing performance across (or within) organisations. Ofwat uses a 'top-down' approach when benchmarking the English and Welsh companies and setting efficiency targets for both capital maintenance and quality spend. This involves using high level comparisons of costs and performance between companies to establish relative efficiency.

For benchmarking capital expenditure efficiency, Ofwat uses two different techniques:

- econometric modelling; and
- capital works unit costs ('the cost base').

Ofwat makes separate assessments of relative efficiency for both the water and the wastewater service. Econometric modelling is used to assess relative efficiency in capital maintenance. The cost base is used to assess relative efficiency in both capital maintenance and capital enhancement expenditure.

11.3 Capital maintenance econometrics

Ofwat's econometric modelling uses statistical regression analysis to establish a relationship between the costs incurred by companies and a defined set of cost drivers. These cost drivers take account of the factors (beyond the control of management) that could influence a water and wastewater company's requirement for capital maintenance.

The econometric models used by Ofwat were originally used in the 1999 price review, and published in April 1998³. The models were developed further with the assistance of Professor Mark Stewart from the University of Warwick. In 2003, Ofwat conducted a detailed review of the models, in consultation with industry representatives, to prepare for the 2004 price review. Ofwat published the final form of the econometric models for the 2004 price review in January 2004⁴.

Although similar to the models which Ofwat published in April 1998, the 2004 models have been re-estimated using 1997-98 'explanatory factors' (see below) and five-year average expenditure for the period 1998-99 to 2002-03⁵. The explanatory factors are taken from the year prior to the first year of expenditure. Average expenditure is used to take account of annual variations in capital maintenance expenditure.

For the purposes of price setting, Ofwat also takes into account the companies' projections for 2004-05 and its own assessment of capital maintenance needs up to March 2010. This enables Ofwat to calculate a 12-year average, reflecting both actual and projected spend equally.

There are nine models for capital maintenance expenditure:

- water resources and treatment;
- water distribution infrastructure;

³ *Assessing the scope for future improvements in water company efficiency: a technical paper*. Ofwat, 30 April 1998.

⁴ *Water and sewerage service unit costs and relative efficiency 2002-03 report*. Ofwat, 22 January 2004.

⁵ In the 2004 price review, an additional year of expenditure data (2003-04) was available to Ofwat, so it re-estimated the models using six-year average expenditure.

- water distribution non-infrastructure;
- water management and general;
- sewerage infrastructure;
- sewerage non-infrastructure;
- sewage treatment;
- sludge treatment and disposal; and
- sewerage management and general.

The purpose of each model is to establish a relationship between the costs reported by the companies and external cost drivers. These cost drivers have a significant impact on costs but are outside the control of the management of the company. By controlling the principal external cost drivers in the models, Ofwat can determine relative efficiency with a high degree of accuracy.

The cost drivers that are included within the econometric models are known as 'explanatory factors'. The models themselves take different forms. These are summarised in Table 11.1.

Table 11.1: 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 storage tower 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 below.

Water resources and treatment

This model predicts the costs of maintaining those assets from which water is sourced (such as dams and aqueducts) and where water is treated (such as water treatment works and associated pumping stations). The model assumes constant returns to scale in capital maintenance expenditure. The number of connected properties is used to represent company size.

Table 11.2: 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 properties	Weighted average industry cost = 8.471
Number of observations: 22	

Water distribution infrastructure

This model predicts 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.

Table 11.3: 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	-4.802	0.542
Log to the base e of (total number of connected properties per length of main, divided by total length of main (km))	0.888	0.200
Form of model	Log to base e of (annual average water distribution infrastructure functional expenditure (£m), divided by length of main (km)) = -4.802 + Log to the base e of (total number of connected properties per length of main, divided by total length of main (km)) x 0.888	
Statistical indicators	Number of observations: 22	R ² : 0.496

Water distribution non-infrastructure

This model predicts 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.

Table 11.4: 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	-6.433	0.533
Log to the base e of (water service reservoir and water tower storage capacity/pumping station capacity)	0.664	0.207
Form of model	Log to base e of (annual average water distribution non-infrastructure functional expenditure (£m), divided by pumping station capacity (kW)) = $-6.433 + \text{Log to base e of (water service reservoir and water tower storage capacity/pumping station capacity)} \times 0.664$	
Statistical indicators	Number of observations: 22	R ² : 0.338

Water management and general

This model predicts the costs of maintaining 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 to represent company size) and recognises that costs increase with a greater proportion of business customers.

Table 11.5: 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 (thousands))	
Explanatory variables	Coefficient	Standard error
Constant	-5.874	0.443
Proportion of properties that are non-household	13.020	5.815
Form of model	Log to base e of (annual average water management and general expenditure (£m), divided by billed properties (thousands)) = $-5.874 + \text{proportion of properties that are non-household} \times 13.020$	
Statistical indicators	Number of observations: 22	R ² : 0.200

Sewerage infrastructure

This model predicts 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 proxy 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 higher maintenance cost of critical sewers (relative to non-critical sewers) is taken into account in the model.

Table 11.6: 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	-6.760	0.278
Log to the base e of (the number of combined sewer overflows divided by the total length of sewer (km))	0.371	0.059
Proportion of critical sewers	1.813	0.726
Form of model	Log to base e of (annual average sewerage infrastructure expenditure (£m), divided by the total length of sewer (km)) = $-6.760 + \text{log to the base e of (the number of combined sewer overflows divided by the total length of sewer (km))} \times 0.371 + \text{proportion of critical sewers} \times 1.813$	
Statistical indicators	Number of observations: 63	R ² : 0.427

Sewerage non-infrastructure

This model predicts the costs of maintaining the non-infrastructure assets of the sewerage service, which are largely sewage pumping stations. The model is based on the premise that capital maintenance expenditure increases uniformly with the number of pumping stations.

Table 11.7: 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	Weighted average industry cost = 2.813
Number of observations: 10	

Sewage treatment

This model predicts 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 from maintaining a few large works compared with maintaining a large number of smaller works.

Table 11.8: 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)	
Explanatory variables	Coefficient	Standard error
Constant	-8.373	0.293
Log to the base e of (the total number of works divided by total load received at sewage treatment works)	0.169	0.043
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) = -8.373 + log to the base e of (the total number of works divided by total load received at sewage treatment works) x 0.169	
Statistical indicators	Number of observations: 60	R ² : 0.210

Sludge treatment and disposal

This model predicts the costs of maintaining the assets 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 that is disposed of.

Table 11.9: 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	Weighted average industry cost = 67.994
Number of observations: 10	

Sewerage management and general

This model predicts the costs of maintaining those assets 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 to represent company size.

Table 11.10: Ofwat's model for sewerage management and general capital maintenance expenditure

Sewerage management and general	
This is a unit cost model. We calculate each company's average annual sewerage management and general capital maintenance expenditure on a per billed property basis. This is then compared with the weighted average industry cost.	
£m/million billed properties	Weighted average industry cost = 7.647
Number of observations: 10	

We discuss the application of Ofwat's capital maintenance econometric models in Scotland in Chapter 13.

11.4 Capital works unit costs

Ofwat uses the capital works unit costs, or 'cost base', approach to assess the relative efficiency of water companies in procuring and implementing capital projects. Ofwat uses the cost base technique to inform its assessment of relative efficiency for both capital maintenance and capital enhancement expenditure.

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, and maintenance and quality investment. Ofwat can

compare the standard costs submitted by the water companies to assess relative procurement efficiency.

The cost base was first used at the 1994 price review and has been used at the 1999 and 2004 price reviews. Although Ofwat has refined the cost base approach over this time, the broad approach remains the same.

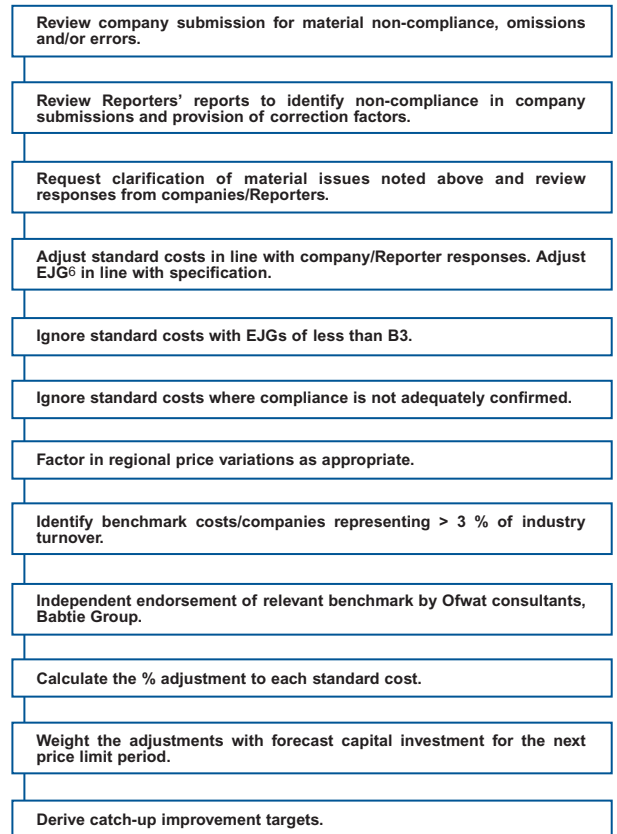
Prior to the 2004 price review, Ofwat consulted with the industry on the format and the content of its cost base information requirement. This consultation identified a need for a number of new standard costs and for modifications to some of the existing standard costs. These changes ensured that the cost base would be consistent with the companies' investment plans. The changes were included in the final business plan reporting requirements.

The cost base approach to assessing relative efficiency has been subject to detailed scrutiny by the Monopolies and Mergers Commission and the Competition Commission. Both found the approach to be fit for purpose.

For the 2004 price review, companies submitted draft standard costs to Ofwat in March 2003. Ofwat published the results of its analysis of these cost base submissions in May 2003. The companies had the opportunity to revise their cost base submissions in their draft and final business plans.

Ofwat described its approach to analysing the cost base in its response to the companies on their initial standard costs submission. The approach is summarised in Figure 11.1.

Figure 11.1: Ofwat's cost base approach



Review the submissions

Ofwat reviews the submissions received from the companies in order to:

- ensure that the standard costs which are submitted comply with the specifications and guidance;
- ensure that the engineering judgement grades have been correctly applied and interpreted;
- confirm that companies have derived their standard cost estimates independently;
- subject all submissions to an independent audit; and
- ensure comparability between companies.

⁶ Engineering Judgement Grades – these are 'confidence' scores that are assigned to the information contained in the submission.

Company-specific factors

In its 2004 price determination, Ofwat allowed only one company-specific factor – an adjustment for regional variations in construction, labour and tender costs. Ofwat has based its assessment of these adjustments on a study of the building and construction cost indices which was published by the Building Cost Information Service and the Department of Trade and Industry.

Regional price factors were applied to the typical civil construction and plant installation elements of each standard cost submitted by the company. This generated company-specific regional price adjustments. The company-specific regional price adjustments ranged from 0.8-17.5% in the water service and 1.7-15.7% in the sewerage service.

Ofwat has not published detailed information about its methodology for calculating these price adjustments, nor has it published a list of the companies that were allowed adjustments.

Benchmark selection

Ofwat chooses as benchmark standard costs the lowest reported cost, provided it complies with the following criteria:

- the standard cost used to derive the benchmark closely complied with the standard cost specification;
- at least 3% of the industry (measured in terms of turnover) reported unit costs at or below the benchmark standard cost;
- the standard cost was of sufficient robustness to warrant an EJM of B3 or better;
- single company standard costs were generally used to derive the benchmark for items commonly procured from a single source over a range of sizes; and
- the relevant benchmark is independently endorsed by consultants to Ofwat, Babbie Group.

In addition, at the 2004 price review, Ofwat asked Babbie Group to compile their own cost estimates for each standard cost in advance of the company submissions being received. These estimates were used to test the appropriateness of the benchmark choice.

Calculation of the targets for catch-up improvement

Ofwat sets capital efficiency targets having:

- calculated the adjustment for each standard cost; and
- weighted the adjustment with forecast capital investment for the next price limit period.

The adjustment to the standard cost is based on the gap between that standard cost and the benchmark, and the scope for closure of that gap.

Ofwat provides the following worked example⁷.

Consider a company that submitted a standard cost of £50 per metre for laying a 200 mm bore water main in a grassland location. The chosen benchmark for this standard cost is £41/m. The company's submitted cost is £9/m higher than the benchmark – a gap of 22%.

Ofwat expects the company to close 50% of this gap⁸ (£4.5/m); hence, the scope for closure is 9% of the submitted standard cost.

In this example, the adjustment is 9%.

Table 11.11: Calculating the adjustment for each standard cost

A	B	C	D	E	F	G	H
Standard cost	EJM	Chosen benchmark	Gap (A-C)/C	Catch-up expected	Scope for improvement (A-C)*E	New revised cost (A-F)	Scope as a % of original standard cost (F/A)
£50/m	A2	£41/m	22%	50%	£4.5/m	£45.5/m	9%

Adjustments are derived for each submitted standard cost for each company. Where a company's submitted cost is below the chosen benchmark, then no adjustment is made.

⁷ Capital works unit costs in the water industry: Feedback on our analysis of the March 2003 water company cost base submissions. Ofwat, May 2003.

⁸ Ofwat assumes that the scope for closure of the gap is 50% for capital maintenance and 75% for capital enhancement.

In order to derive the overall improvement required, each adjustment is weighted using each company's forecast capital investment for the price control period.

Ofwat provides the following worked example of this process.

Consider again the submitted standard cost for laying a 200 mm bore water main in a grassland location for which an adjustment of 9% was assessed. This adjustment must then be weighted by the forecast proportion of capital investment for this type of work.

Say, for example, the company forecasts that 50% of its overall water service investment will be spent on potable mains, with 40% of this to be spent on mains laying in grassland locations. Further, of the company's mains stock, 15% are mains of nominal bore 200 mm. Of the overall water service investment, 60% of this will be on infrastructure assets (mains and communication pipes).

Calculation of the proportion of investment in this type of work takes the form:

$$\frac{\% \text{ mains stock} \times \% \text{ mains investment} \times \% \text{ water service for potable mains}}{\% \text{ of total water investment that is infrastructure}}$$

or,

$$\frac{15\% \times 40\% \times 50\%}{60\%}$$

This results in a weighting of 5% to be applied to this standard cost, ie 9% x 5%. That is, the weighted adjustment for this standard cost is 0.45%.

All of the weighted adjustments for all of the standard costs for the water infrastructure are added together and the catch-up improvement target is derived. An example of this process is set out below.

	Adjustment (scope for catch-up improvement)	Proportion of forecast investment in this type of work	Weighted adjustment
Standard cost 1	9%	5%	0.45%
Standard cost 2	4%	8%	0.32%
....
Standard cost x	x %	x %	x %
TOTAL		100 %	4.65 %

In this example, the overall catch-up improvement target for the water infrastructure is 4.65%.

Ofwat uses this method to calculate catch-up improvement targets for the following areas: capital maintenance and capital enhancement expenditure; water and sewerage infrastructure, and water and wastewater non-infrastructure.

11.5 Summary

The methods that Ofwat uses to assess the scope for capital efficiency in the water industry in England and Wales are well established and have been developed over a number of years. They have also been subject to scrutiny by a range of interested parties and by the Competition Commission.

The methods involve the use of detailed econometric models to establish relative efficiency in capital maintenance and analysis of capital works unit costs to determine overall procurement efficiency.

The models are information-intensive and are specific to the water and wastewater industry. They provide Ofwat with a quantitative way to determine relative efficiency between companies and establish the scope for improvement. As such, they provide an invaluable aid to setting robust targets and ensuring that customers receive value for money from the investment programmes.

11.6 Question for consultation

1. What are respondents' views on Ofwat's methods for assessing capital expenditure efficiency?
2. What other approaches to the assessment of the scope for capital efficiency would respondents suggest? How would these work?

Section 3: Chapter 12

Other ways to assess capital expenditure efficiency

12.1 Introduction

In the *Strategic Review of Charges 2002-06* we based our approach to assessing the scope for capital efficiency on the approach used by Ofwat; we also took into account the efficiency improvements that have been achieved by the companies in England and Wales.

The chapter begins by discussing the approach we took at the last Review. We amended the Ofwat approach to reflect the limited information that was available to us about the water industry in Scotland at that time. The quality and quantity of the information about the components of the asset base, historic expenditure, current asset management practices and the outputs of the proposed investment programme meant that we could not use entirely the same approach as that which Ofwat used.

Outside of the water industry, other regulators use different approaches to assessing the scope for capital efficiency. In this chapter we present an overview of the approaches taken by the economic regulators of the electricity, gas, rail infrastructure, telecommunications, post and aviation industries.

Our approach to assessing the scope for capital efficiency in Scottish Water will take account of these different approaches.

12.2 Our approach in the Strategic Review of Charges 2002-06

In the *Strategic Review of Charges 2002-06* we adapted the Ofwat methodology for assessing capital expenditure efficiency in order to take account of the relatively poor quality information in the water industry in Scotland. We needed to overcome the following issues:

- There was no independent scrutiny of the information submissions of the three authorities by Reporters;
- There was no systematic collection of serviceability¹ indicators that could be used to assess and monitor the performance of the asset base; and

- Information on the number of assets, their condition and performance and historic levels of expenditure was also limited.

We therefore developed an approach which, although based on the Ofwat methodology, took account of the situation in Scotland.

We divided the planning and delivery of capital expenditure into four distinct areas and used both quantitative and qualitative methods to assess the scope for efficiency in each area. The potential for efficiency would therefore be the sum of the efficiency identified at each of four stages:

- Strategic asset management – these are savings that can be made by not spending money that was allocated. In terms of efficiency, this must be done without sacrificing output. An example would be replacing pumps every five years as opposed to every three years.
- Programme planning or investment appraisal – these are savings that result from finding the most cost-effective way to deliver objectives. Investment appraisal is the process of establishing whether a project delivers its objectives in the most cost-effective way.
- Procurement – these are savings that arise from improved procurement of capital projects. This would include the initial contract, management of delivery and commissioning of the asset. We were able to use the information supplied to us in the annual return, and similar information provided to Ofwat, about the costs of standardised capital projects in order to assess the potential for savings.
- Innovation – these are savings that come from 'doing it in a new way'. The Babbie Report² into lower cost technologies and processes in the water industry was a key input in this area.

¹ Serviceability indicators are measures of customer service and asset performance such as the number of interruptions to supply or the incidence of sewer flooding.

² Babbie Environmental, report and opinion on the scope for widescale adoption of lower cost new technology and practices in the water industry', Ofwat, 1998.

To establish the scope for efficiency in each of these areas we drew on three separate sources of information:

- assessment of investment performance from the 'Information Project';
- industry consultation; and
- cost base analysis.

We also took full account of the improvements that had been made by the companies south of the border.

The Information Project

In 1999 we advised Ministers that we should gather the information required to allow rigorous comparisons between the industry in Scotland and in England and Wales. We established the 'Information Project', which was contracted to a consortium of Cap Gemini Ernst & Young, Yorkshire Electricity and WS Atkins.

The principal output of this project was the format and definitions for an 'annual return' of asset, customer and financial information for each of the three former water authorities. The project also included an assessment of the gaps in information and in management processes that would impact on the quality and extent of the information submitted. The consultants compared the authorities with industry best practice across utilities in England and Wales in areas such as their strategic approach to investment planning, the quality of information and their capital programme management.

The consultants concluded that the three authorities fell well short of best practice, particularly in the areas of strategic long-term investment planning, strategic asset management and in adopting a risk-based approach to long-term investment. We asked the authorities to prepare action plans to explain how they intended to address these issues.

The consultants' conclusions were an important component of our assessment of the scope for capital expenditure efficiency in the water and wastewater industry in Scotland. These conclusions were explained in detail in the *Strategic Review of Charges 2002-06*.

Industry consultation

We conducted a series of structured interviews with a number of companies in the water sector, the wider utilities sector and in other asset-intensive industries. We also interviewed other UK utility regulators, trade associations, contractors and consultants.

We used these structured interviews to help develop our understanding of what might be achieved in terms of capital efficiency in strategic planning, procurement and project management. These interviews broadly confirmed the conclusions of the consultants working on the Information Project. There was a common belief that efficient delivery of the capital programme of the water industry in Scotland would require a step-function change in the way the industry planned, managed and contracted capital programmes.

Cost base analysis

We described Ofwat's cost base analysis in the previous chapter. We used the cost base analysis to assess the gap in procurement efficiency between the authorities and the privatised companies in England and Wales.

Each of the water authorities submitted a cost base using the same specifications as Ofwat had used in its 1999 price review. The authorities' capital unit costs were benchmarked against Ofwat's chosen benchmark costs, and the comparisons weighted using the authorities' proposed capital expenditure programmes for 2002-06. This analysis allowed us to calculate the relative efficiency gap in procurement between the industry's costs in Scotland and the benchmark costs in England and Wales.

The scope for improvement through innovation was taken from the Babbie Group report.

The overall approach for assessing capital efficiency is summarised in the following table:

Table 12.1: Methods for assessing capital efficiency

Area identified for efficiency	Tools
Strategic asset management	Information Project, industry consultation, benchmarking
Programme planning (appraisal)	Information Project, industry consultation, benchmarking
Procurement	Cost base analysis
Innovation	Babtie Group report

Our analysis³ showed that there was significant scope for efficiency in the delivery of capital investment in Scotland. We decided to set the target on the same basis that we had used for operating expenditure. We therefore required the industry to close 80% of the assessed gap in efficiency between the industry in Scotland and the Ofwat benchmark (not the leading companies). We also decided to phase the capital efficiency targets over four years, rather than apply the total efficiency in the first year.

- We applied the capital expenditure efficiency target to 92% of the Quality and Standards capital programme.
- We applied the operating cost efficiency targets to 8% of the programme that was capitalised operating costs.

Over the last three years we have seen an improvement in the quality of regulatory information. In Chapter 13 we discuss how improved information has changed our proposed approach to establishing the scope for capital efficiency in the *Strategic Review of Charges 2006-10*.

It is helpful to consider the approaches taken by other regulators to assessing the scope for capital efficiency in order to establish whether standard practices are adopted and whether they might be applicable to the water industry in Scotland. We believe that it is in the customer interest to adopt best practice in determining the scope for capital expenditure efficiency.

12.3 Office of Gas and Electricity Markets (Ofgem)

Ofgem is the regulator of the UK gas and electricity markets. It sets prices for the companies that operate the monopoly 'pipes and wires' businesses which distribute electricity and gas across the UK. The companies that are subject to price control regulation are:

- National Grid Transco, for high voltage electricity transmission in England and Wales and national and regional gas distribution;
- Scottish Power and Scottish and Southern Energy, for high voltage and local electricity distribution in Scotland; and
- the 12 companies responsible for local electricity distribution in England and Wales.

Ofgem uses incentive-based regulation.

Electricity

In its most recent price determinations, Ofgem used a broadly similar approach to assess capital expenditure efficiency for the high voltage electricity networks, and the local distribution networks^{4, 5} in Scotland and in England and Wales.

Ofgem splits the companies' proposed capital expenditure into two components:

- Load related expenditure (LRE) – expenditure required to enable the connection of new generation capacity and new customers to the transmission system, and to reinforce the existing system to accommodate growth.
- Non-load related expenditure (NLRE) – expenditure required to replace old or poorly performing assets.

³ The assessment of the scope for capital efficiency is described in detail in the *Strategic Review of Charges 2002-06* Section 4, Chapter 19.

⁴ 'The transmission price control review of the National Grid Company from 2001 – Transmission asset owner: Final proposals'. Ofgem, September 2000.

⁵ 'Reviews of public electricity suppliers 1998 to 2000 – Scottish transmission price control review: Final proposals'. Ofgem, December 1999.

Ofwat worked with consultants PB Power to develop models to forecast both LRE and NLRE. These models are summarised in the recent draft determinations for the local electricity distribution networks⁶:

“6.73. LRE has been modelled by benchmarking the DNOs (Distribution Network Operators) forecast and historic spend as a proportion of Modern Equivalent Asset Value (MEAV) per customer and per GWh. The model considers a 15 year period from 1995 to 2010. The model applies the median ratio of future to historic spend for each DNO to arrive at the LRE projection.

“6.74. The NLRE model uses the DNOs’ asset populations at March 2003 and applies a replacement profile for each asset category. The replacement profile used is the same for all DNOs – and is based on the DNOs’ own profiles included in the FBPQs (Final Business Plan Questionnaire). The same set of unit costs (as advised by PB Power) have been applied to all DNOs, although an adjustment has been made for EDF-LPN to reflect regional factors.

“6.75. A slightly modified approach has been used for overhead lines. A high proportion of overhead lines are refurbished rather than replaced therefore overhead lines have been modelled using assumptions on refurbishment cycles and proportion of replacement.”

Ofgem uses these models to determine how much capital expenditure to allow in the price settlement.

Ofgem considers maintenance expenditure and operating expenditure together. It uses a five-stage approach to assess operating cost. The third step of this analysis estimates efficient cost levels. Ofgem uses top-

down benchmarking techniques to assess the scope for efficiency. It used regression analysis to forecast operating costs. Ofgem also makes adjustments to take account of special factors and the scope for continuing cost reductions over the price control period.

Gas

In its most recent price review of the gas transportation and metering network in the UK, Ofgem set separate price controls for the national transmission system (NTS) and the 12 local distribution zones⁷ (LDZs). It also set price caps for metering and meter reading services⁸. Ofgem used consultants, Mazars Neville Russell, Petroleum Development Consultants, and Arthur Anderson.

Ofgem’s consultants split capital expenditure into two elements:

- capital expenditure (the construction of new assets); and
- replacement expenditure (replacing existing assets, largely to meet health and safety requirements).

The consultants looked in detail at Transco’s proposed expenditure for the price control period and, using a bottom-up approach, identified the scope for savings in each category.

Ofgem also considers gas industry maintenance expenditure and operating expenditure together. It commissioned Europe Economics to complete a top-down study of an appropriate allowance for operating costs.

12.4 Office of Rail Regulator (ORR)⁹

ORR regulates Network Rail, the monopoly owner of the rail network (that is, track, signalling, tunnels, stations, bridges and depots). ORR is required, by statute, to

⁶ ‘Electricity distribution price control review – Initial proposals’. Ofgem, June 2004.

⁷ In 2002, Transco re-organised the 12 LDZ into 8 regional networks and Ofgem revised the settlement such that the total distribution revenue for the 8 regions was equal to the total revenue for the 12 LDZs.

⁸ ‘Review of Transco’s price control from 2002: Final proposals’. Ofgem, September 2001.

⁹ From Summer 2004, the ORR became the Office of Rail Regulation.

ensure that Network Rail has sufficient revenues and the appropriate financial framework that it needs to operate, maintain and renew the rail infrastructure.

ORR sets track access charges for:

- franchised passenger train services; and
- freight services.

ORR also uses incentive-based regulation. It used essentially the same approach in identifying the scope for capital expenditure efficiency in both of its determinations of charges for franchised passenger train services and freight services.

ORR adopted a two-stage approach to assessing the industry's capital expenditure in its 2003 interim review of access charges for the then newly established Network Rail¹⁰.

- In Chapter 12 we explained how ORR undertook a detailed examination of the activities planned by Network Rail. Where work could not be justified, or it appeared that work was unnecessary, ORR did not provide funding.
- ORR also examined the scope for efficiency savings. This step of ORR's analysis is considered here.

ORR used independent consultants to undertake a number of detailed studies, which were designed to identify the scope for improvement in capital expenditure efficiency.

- Intra-company (or regional) benchmarking¹¹

Network Rail is organised into seven regions. This study used comparisons of normalised unit costs to identify best practice in operating, maintaining and renewing the network. The consultants assessed the

potential for efficiency savings if Network Rail adopted best regional practice across the whole network.

- Analysis of Network Rail's procurement strategy¹²

The consultants analysed Network Rail's procurement strategy across six major market sectors. They reviewed the major processes and activities in (i) strategy and planning, (ii) sourcing and contracting, and (iii) delivery and execution for each sector. The consultants assessed the potential for cost savings if Network Rail were to adopt best practice from other industries in its procurement strategy.

- International benchmarking¹³

The consultants compared Network Rail's practices in track maintenance and renewal with four international rail companies. The purpose of the study was to identify best practice in track maintenance and renewal and to assess the potential for efficiency savings in Network Rail.

In addition to these studies, ORR considered other areas where it believed potential efficiencies could be made. These were:

- the scope for improvements in productivity within Network Rail's existing possession patterns¹⁴;
- the benefits associated with the introduction of new technology; and
- a review of standards¹⁵.

12.5 Office of Communications (Ofcom)

Ofcom regulates the UK communications industries, including television, radio, telecommunications and wireless communications. It replaced the Office of Telecommunications (OfTel) in 2003.

¹⁰ 'Access Charges Review: Final Conclusions'. ORR, December 2003.

¹¹ 'Regional benchmarking: Report for Network Rail', ORR and SRA. L.E.K. Consulting, 24 July 2003.

¹² 'Review of Network Rail's supply chain'. Accenture, 25 July 2003.

¹³ 'International benchmarking: Report to ORR, Network Rail and SRA'. L.E.K. Consulting, TTCI, Halcrow Group Ltd., 24 July 2003.

¹⁴ Possessions are when Network Rail restricts access to stretches of track to allow for engineering works.

¹⁵ Fundamental review of the standards regime to ensure efficient, value for money and effective delivery of Network Rail's safety obligations.

Ofcom (and, previously, Oftel) set price caps on British Telecom's (BT) charges for the following:

- Use of the network – the charges that BT levies on other service providers for access to, and use of, its fixed line network. The regulator applies price controls only to those services which are not yet subject to competition, or cannot be made competitive.
- Retail services – the charges that BT levies on customers for telephony services.

Oftel used incentive-based price cap regulation. In the most recent review of network charges published in 2001, Oftel used its financial model to forecast investment over the control period. This was calculated as the sum of two components¹⁶:

“ 4.50 The second approach was to use the model to derive projections for investment. In a steady state, and if actual asset lives are properly reflected in the asset lives used in the accounts, capital expenditure should be equal to CCA¹⁷ (OCM)¹⁸ depreciation. Capital expenditure can then be forecast as the sum of two components, one equal to the OCM depreciation at base year volumes and one to allow for investment necessary to support volume growth over the period, determined by the asset volume elasticity. This has the merit of producing projections of investment that are consistent with whatever level of traffic growth is forecast. The proposed values of 'X' are based on this second approach.”

The asset-volume elasticity is the percentage increase in gross assets for a 1% increase in volume. Oftel estimated the asset-volume elasticity for access and network costs based on a top-down analysis of BT's actual costs.

Oftel did not apply an efficiency target to this forecast of BT's capital investment expenditure requirement.

12.6 Postal Services Commission (Postcomm)

Postcomm is the economic regulator of postal services in the UK. It uses incentive-based regulation.

Royal Mail's capital expenditure is a relatively small proportion of overall expenditure (around £160 million in 2004-05, which was less than 3% of total costs). At the current time, Postcomm has required capital expenditure to be funded from customer revenue.

In its most recent price review, Postcomm commissioned WS Atkins to undertake a detailed study of the efficiency of Royal Mail's inland letters business¹⁹.

WS Atkins concluded that four adjustments to Royal Mail's proposed capital expenditure were required:

1. An adjustment “to reflect efficiency in the way capital expenditure is planned, assets are managed and schemes are appraised, designed, specified, procured and implemented”. This adjustment comprised two elements: an on-going annual investment and a narrowing of the gap to best practice.
2. An adjustment to the phasing of some projects.
3. An adjustment for expenditure which was disallowed because it could not be justified.
4. An adjustment for delivering some of the capital expenditure outputs using alternative approaches.

With regard to the scope for capital expenditure efficiency, WS Atkins concluded:

“15.35 Capital efficiencies can be made in two areas; firstly in the selection and timing of the most appropriate and effective solution or project, and secondly in the cost of procuring the assets to provide this project

¹⁶ 'Proposals for network charge and retail price controls from 2001'. Oftel, February 2001.

¹⁷ Current cost accounting.

¹⁸ Operating capability maintenance.

¹⁹ 'An efficiency study of Consignia's inland letters business'. Report by WS Atkins for Postcomm, November 2002.

(including managing the project). In deriving an appropriate level of capital efficiencies to apply to expenditure proposals, we normally take a qualitative view of the management of the capital programme to assess the first factor. A quantitative comparison of the unit cost of procuring the main work items is normally used to derive a level of efficiency for the second.

“15.36 We have compared Consignia’s²⁰ current capital planning processes with other utilities, in both the private and public sectors, to take a view of the level of ‘catch-up’ needed to meet current efficient best practice in this area. We have then applied an annual percentage efficiency which reflects normal business efficiencies which can be achieved over time.

“15.37 Quantitative comparisons of asset procurement costs have been inconclusive as there has been insufficient cost information available, and there are insufficient comparators to use. We have therefore applied a qualitative approach based on a comparison of procurement processes with other utilities.”

12.7 Civil Aviation Authority (CAA)

The CAA regulates civil aviation in the UK, including the economic regulation of airports and the National Air Traffic Control Service (NATS).

The CAA sets price caps for the following:

- Airport charges

The CAA regulates the charges at four airports: Manchester Airport and three London airports (Heathrow, Gatwick and Stanstead), which are owned by BAA.

- Charges for air traffic services

The CAA originally provided advice to the Government on the charges to be levied by NATS for air traffic services for the five years from 1 April 2001. In 2001, the Government extended the CAA’s role to include economic regulation of air traffic control. The CAA will set price caps for NATS from 1 April 2006.

Airport charges

The CAA refers the four airports to the Competition Commission every five years. The Competition Commission is asked to recommend a price cap for each airport and to decide whether the airports have acted against the public interest during the previous five years. The CAA then sets price caps and conditions for the five-year price control period, based on the result of the Competition Commission’s inquiry.

The Competition Commission reviewed the capital investment programmes of the four airports during the previous price control period (1998-99 to 2002-03), their projected investment programmes and their investment planning.

Manchester

The Competition Commission asked quantity surveyors WTP to assess Manchester Airport’s capital expenditure efficiency in the period 1998 to 2008. WTP examined two projects completed in the period 1998 to 2003, and two projects proposed for 2003 to 2008. Their assessment included:

- a comparison of unit capital costs with other large UK projects;
- a comparison of Manchester Airport’s performance with that of other airports;
- whether the capital expenditure assumptions in the financial projections that Manchester Airport had prepared were demonstrably efficient;

²⁰ Consignia was the corporate name for the Post Office and Royal Mail at the time of the study.

- whether any projected changes in real unit capital costs were appropriately estimated; and
- whether Manchester Airport's procurement and project management methods reflected best practice.

The Competition Commission accepted Manchester Airport's estimates for capital expenditure and did not adjust the estimates for historic or future efficiencies²¹.

BAA

The Competition Commission also asked quantity surveyors WTP to examine BAA's capital expenditure efficiency. WTP examined one project completed during 1998 to 2003, and one project proposed for 2003 to 2008 from each of the three airports.

The Competition Commission accepted BAA's proposed capital expenditure²².

12.8 Summary

Our approach to determining the scope for capital efficiency targets in the *Strategic Review of Charges 2002-06* drew on the approach used by Ofwat. We had to adapt this approach to reflect the limited information available about the water industry in Scotland.

Our analysis of the methods used by other regulators to establish the scope for capital efficiency indicates that there is no standard regulatory approach. Regulators have developed approaches that are tailored to the particular characteristics and asset bases of the industry they are regulating.

12.9 Question for consultation

1. Are there are lessons that we should learn from the experience of other regulators?

²¹ Line 2.177j, Chapter 2: Conclusions, '*Manchester Airport plc: a report on the economic regulation of Manchester Airport plc*'. Report by the Competition Commission, December 2002.

²² Line 2.376b, Chapter 2: Conclusions, '*BAA plc: a report on the economic regulation of the London airports companies (Heathrow Airport Ltd, Gatwick Airport Ltd and Stanstead Airport Ltd)*'. Report by the Competition Commission, November 2002.

Section 3: Chapter 13

Our proposed approach to assessing capital investment efficiency

13.1 Introduction

In Chapters 11 and 12 we described the methods used by Ofwat and other regulators to assess the scope for efficiency in capital investment. In particular, we noted that Ofwat's methods for benchmarking companies' performance are well established and have been scrutinised in detail by the Competition Commission. The approach outlined in this chapter would need to be amended if Scottish Water is tasked with delivering an unprecedented capital programme.

We are pleased to note that we now receive improved regulatory information. This allows us to use the benchmarking techniques developed by Ofwat to compare the investment performance of Scottish Water with that of the companies in England and Wales. In the *Strategic Review of Charges 2006-10*, we propose to use Ofwat's econometric models and its 'cost base' approach to assess the scope for efficiency in Scottish Water's capital investment programme.

In this chapter we explain how we propose to adapt Ofwat's approach in order to accommodate the remaining differences in the quality of regulatory information. We examine:

- the changes in our approach since the last *Strategic Review*;
- how we propose to assess capital maintenance efficiency;
- how we propose to assess capital enhancement efficiency; and
- how we ensure that these assessments take due account of the Scottish context.

We also discuss the importance of ensuring that we compare performance on a like-for-like basis. In particular, we need to take due account of any factors that make Scottish Water different from the companies in England and Wales.

13.2 Changes in approach from the Strategic Review of Charges 2002-06

As part of the *Strategic Review of Charges 2002-06*, we commissioned a study by expert consultants into the investment planning of the three former water authorities¹. This study identified significant shortcomings compared with best practice in England and Wales. In particular, it highlighted problem areas such as strategic asset management; asset information; and capital programme planning.

We analysed the efficiency improvements achieved by the companies south of the border. This analysis identified the extent of the capital efficiency gap between the companies and the former water authorities². We set a target that Scottish Water should close 80% of the assessed efficiency gap.

We do not propose to commission a similar assessment for the *Strategic Review of Charges 2006-10*. We believe that we are now in a position to adopt Ofwat's approach and compare Scottish Water's relative performance in capital investment delivery. This is possible because Scottish Water has made significant progress in improving the regulatory information that it provides to this office. We believe that using an approach which is consistent with that used by Ofwat will ensure that our conclusions are robust.

13.3 Ofwat's approach

Ofwat makes separate assessments of relative efficiency for capital maintenance and capital enhancement investment. We set out below our proposed use of Ofwat's approach to assess relative efficiency for these two types of investment.

Notwithstanding the improvements in the regulatory information that we now receive, there are still gaps in the information. As a result we are not able to implement Ofwat's methods in full. We believe that these issues can be overcome, however, and we outline below our proposals to deal with them.

¹ North of Scotland Water Authority, West of Scotland Water Authority and East of Scotland Water Authority.

² This analysis, and how it informed our assessment of the efficiency gap, is described in detail in the *Strategic Review of Charges 2002-06*, Chapters 3, 8 and 19.

13.4 Assessing efficiency for capital maintenance

Ofwat uses its econometric models and its 'cost base' analysis to determine capital maintenance efficiency targets for each company. We described these two techniques in detail in Chapter 11. We propose to use both econometric modelling and cost base analysis to assess the scope for efficiency in Scottish Water's capital maintenance investment.

Econometric modelling

Ofwat's econometric models use regression analysis to establish a relationship between the costs incurred by companies and a defined set of cost drivers. These cost drivers take account of both physical and financial factors that could influence a water and wastewater company's costs.

We propose to use these models to make an initial assessment of the appropriate level of capital maintenance investment by Scottish Water. We would populate the models with information on the physical and financial characteristics of Scottish Water.

In applying the econometric models, Ofwat assesses the relative performance of the companies in the period 1998-99 to 2002-03. The econometric models are based on the characteristics of companies' assets and other cost drivers, in 1997-98. Ofwat analyses a five-year period in order to make sure that its assessment of the level of efficiency is not impacted by annual variations in spending. Ofwat uses this information in its annual reports³ to rank companies' capital efficiency performance.

Ofwat collects this information at each price review through its capital maintenance return. We collect equivalent information in Scottish Water's annual June Return. Unfortunately we do not have this information for the water industry in Scotland prior to 2003-04. As a result we are not able to use the models to compare

Scottish Water's capital maintenance costs with the companies' costs to determine relative performance over time.

However, we can use the models to predict the expenditure that Scottish Water should incur given its current asset base. In other words, we can establish how much Scottish Water should need to spend to maintain its assets if it were as efficient as the average company in England and Wales.

Serviceability

Ofwat examines long-term trends in serviceability to ensure that the models do not underestimate the investment required to maintain the serviceability of assets. We do not have sufficient information to replicate Ofwat's analysis of long-term serviceability trends for Scotland. We do, however, have some information about Scottish Water's recent performance.

In its first draft business plan, Scottish Water indicated that it had used information on serviceability to determine its future capital maintenance investment. We will ask the Reporter to examine Scottish Water's approach to capital maintenance in its investment plan. In particular, we will ask him to assess whether Scottish Water's approach complies with the UKWIR common framework⁴.

We propose to extend our regulatory returns to gather the full range of information for the serviceability indicators used by Ofwat. In the longer term, this will allow us to use a serviceability approach to determine whether the levels of capital maintenance investment remain appropriate. In the shorter term, we can use the information from Scottish Water's current performance to monitor and report on the levels of serviceability provided to customers.

This establishes a baseline against which we can compare future serviceability.

³ Water and Sewerage unit costs and relative efficiency.

⁴ We describe the UKWIR common framework in Chapter 3 of this volume.

Cost base analysis

Ofwat uses cost base analysis to assess the scope for procurement efficiency for both capital maintenance and capital enhancement investment. Ofwat uses both cost base analysis and the results from the econometric models to determine the capital maintenance efficiency targets for each company.

We have collected cost base information for Scottish Water and the three former authorities since 2000-01. In 2004, we updated our requirements for cost base information to ensure that our approach would be consistent with that used by Ofwat. We can therefore apply the cost base approach to both capital maintenance and capital enhancement investment.

13.5 Adjusting the econometric models for Scotland

We need to make some largely technical adjustments to Ofwat's econometric models to ensure that we can use them to analyse Scottish Water's performance. These include:

- adjusting for the different timeframes of the price reviews;
- taking account of the range of performance in England and Wales; and
- accounting for the characteristics of Scotland and Scottish Water.

Adjusting for the different timeframes

Ofwat's econometric models assess the performance of the companies over the five-year period from 1998-99 to 2002-03. We want the models to predict appropriate levels of capital maintenance for the 2006-10 regulatory control period. We therefore need to update the models to reflect the different timeframes.

We believe that if we adjust the models for the following three factors then the answers will be reliable:

- Inflation

We intend to use the COPI⁵ index to adjust predicted costs from the price base in Ofwat's econometric models (2002-03) to the 2005-06 price base that we propose to use in the *Strategic Review*.
- Improvements in the performance of companies since the period 1998-99 to 2002-03

We propose to estimate the annual rate of improvement in the companies' performance and to adjust the models to reflect this. We will base our adjustments on annual reports on the progress the companies have made.
- Ofwat's assessment of companies' capital investment needs, where this differs from the period 1998-99 to 2002-03

The companies' understanding of their capital maintenance requirements is improving. The UKWIR common framework encourages companies to better target their investment. There is also some evidence that capital maintenance activity needs to increase. We will study Ofwat's final determinations⁶ to assess companies' claims for a higher level of capital maintenance and Ofwat's response.

The range of performance in England and Wales

Ofwat's models predict capital maintenance investment for a given asset base, assuming average levels of efficiency. We propose to take account of the range of actual company results.

Applying Ofwat's models to Scottish Water

We also need to consider the applicability of Ofwat's models to Scottish Water. We propose to examine carefully the following:

- whether there are features of Scottish Water's assets that require separate analysis because of differences with the assets in England and Wales;

⁵ COPI is the Construction Output Price Index, calculated and published quarterly by the Department of Trade and Industry.

⁶ Future water and sewerage charges 2005-10 – Final determinations.

- whether there are geographic, economic or other external factors in Scotland that affect the costs of carrying out capital maintenance, relative to England and Wales.

We discuss these points in more detail later in this chapter.

13.6 Step-by-step application of Ofwat's econometric models

We propose to use the following approach in using Ofwat's econometric models to assess Scottish Water's capital maintenance requirements.

Step 1

We will need to confirm the reliability of the required information on assets, customer numbers and volumes. We propose to seek the Reporter's opinion on the quality of information provided by Scottish Water. If the Reporter considers that an item of information is not sufficiently reliable, we will ask him to provide an estimate of the likely range of error.

Step 2

We will need to confirm that, over the period modelled by Ofwat (1998-99 to 2002-03), companies' capital maintenance investment delivered stable or improved asset serviceability. In making this assessment, we will use the serviceability indicators that Ofwat publishes. This is an important step, because we are keen to ensure that Ofwat's models will predict a level of capital maintenance for Scottish Water that is sufficient to maintain current levels of serviceability.

Step 3

We will input the Step 1 information into each of Ofwat's 2004 price review econometric models. This will allow us to calculate an initial predicted cost for Scottish Water's annual capital maintenance investment for each activity.

Step 4

We will add the results of each of the models to obtain an initial total predicted annual capital maintenance requirement for Scottish Water.

Step 5

We will adjust the predicted maintenance investment to ensure that it is consistent with the 2005-06 price base of the *Strategic Review of Charges 2006-10*. We propose to use the COPI inflation index for this adjustment.

Step 6

We propose to apply further adjustments to the results of Step 5. This will allow us to take account of the following:

- improvement in capital maintenance efficiency by the companies since 1997-98;
- the performance of leading companies, as distinct from the average performance predicted by the models; and
- claims by the companies, where Ofwat has accepted them, for higher levels of capital maintenance.

Step 7

We may adjust the predicted costs further to ensure that we take account of Scottish Water's particular circumstances. These adjustments might comprise the following:

- special factors that lead to higher or lower costs being incurred in Scotland for capital maintenance activities, relative to England and Wales; and
- claims by Scottish Water for specific capital maintenance investment.

We believe that these seven steps should ensure that our analysis of the capital maintenance requirement is accurate.

Confirming the results of the models

We are confident that our approach is robust. To confirm the results, we propose to carry 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 propose to take into account:

- the value of the asset base;
- the condition of the asset base; and
- the numbers and types of assets.

We would adjust our results upwards should these comparisons suggest that the predicted level of capital maintenance investment is low for Scottish Water relative to that for the companies.

13.7 Setting an appropriate level of capital maintenance

We also examine other evidence to determine an appropriate efficient level of capital maintenance. In particular, we propose to consider the following:

- The results of the cost base analysis for capital maintenance investment

We described Ofwat's cost base approach in Chapter 11. We will use the cost base to assess Scottish Water's current procurement efficiency for capital maintenance investment.

- Available information on Scottish Water's recent annual levels of capital maintenance

We propose to examine recent levels of capital maintenance investment by Scottish Water and the former authorities. This will help us to assess whether current investment is significantly higher or lower than that which is predicted by the econometric models. We will ask Scottish Water to explain any significant variances.

- Available information on recent trends in the serviceability of Scottish Water's assets

We propose to use the available information on the performance of Scottish Water's assets to inform our assessment of the appropriate level of capital maintenance.

- Scottish Water's first and second draft business plans

We will examine the capital maintenance investment projections in Scottish Water's business plans. This analysis will include:

- the geographical coverage of investment projects;
- the quantity, size and type of assets that Scottish Water wishes to target;
- Scottish Water's assessment of the improvements in levels of service that it expects;
- Scottish Water's overall assessment of its capital maintenance requirements and any justification of these requirements.

In Chapter 14 we discuss how we assess the scope for future improvement in efficiency. In Chapter 15 we discuss how we set targets for Scottish Water.

13.8 Assessing relative efficiency for capital enhancements

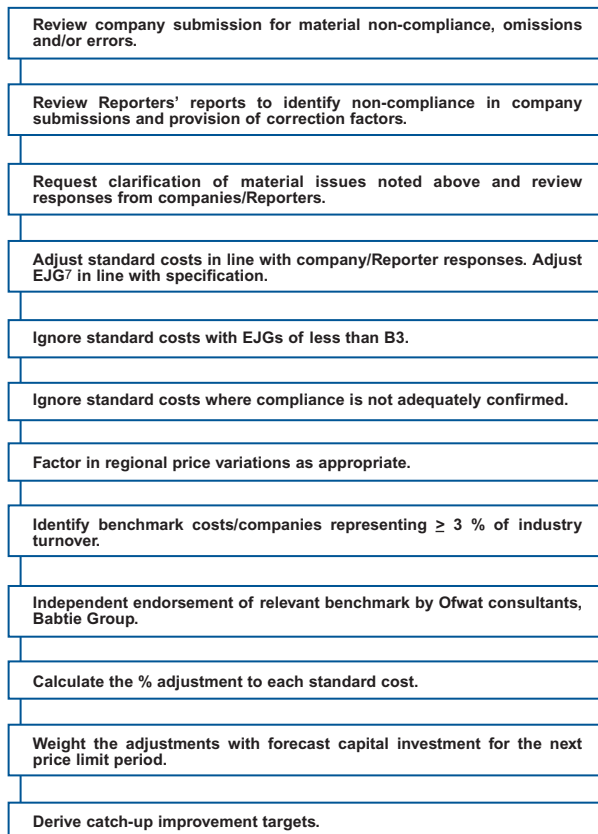
We propose to use Ofwat's cost base approach to benchmark Scottish Water's efficiency in delivering capital enhancement projects. We described this approach in Chapter 11.

We will require Scottish Water to provide us with information for this analysis. We will use independent consultants to report on the:

- costing systems;
- alignment of costing methods between the cost base and the investment plan costings;
- reliability of standard costs; and
- comparability with England and Wales.

We believe that it will be possible to apply Ofwat's cost base in full. Figure 13.1 summarises Ofwat's approach.

Figure 13.1: Ofwat's cost base approach



We recognise that this analysis is particularly specialised; we therefore propose to use independent expert consultants to carry out the analysis of relative efficiency. These consultants will need to demonstrate their familiarity with Ofwat's approach. This analysis will cover both capital maintenance and capital enhancement investment.

The consultants will assess a quantified procurement efficiency gap for capital enhancement investment, expressed as a percentage of capital enhancement investment.

We also propose to assess the impact of carrying out this work in Scotland on Scottish Water's relative capital

investment costs. We discuss this further in the next section.

13.9 The impact of operating in Scotland

Volume 4 of this methodology⁸ discussed our proposed approach to establishing the scope for operating cost efficiency. In Chapter 10 of that volume, we set out how we propose to ensure that the operating expenditure comparisons we make between Scottish Water and the companies in England and Wales are on a like-for-like basis. We consider that similar arguments could be applied to comparisons of capital expenditure efficiency.

There may be factors that influence investment costs which are not adequately reflected in the analysis techniques that we have described above. Some of these factors will be within the control of management and therefore should be excluded from any comparison. Management should be able to take corrective action to address any such negative impacts.

Other factors may be beyond management control and could either increase or decrease the level of cost. Such factors may relate to the operating environment or the level of service provided to customers.

Our assessment needs to take account of any relevant factors which are beyond management control but which influence costs. We therefore ask Scottish Water, as part of its business plan submissions, to draw to our attention all factors that influence cost. This should include factors that both increase or decrease cost.

We want to ensure that our efficiency targets neither unduly penalise nor reward 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 consider that our comparisons with England and Wales help to ensure that customers receive value for money and that Scottish Water delivers improved service to customers and the environment.

⁷ Engineering Judgement Grades – these are 'confidence' grades assigned to the information contained in the submission.

⁸ *Our work in regulating the Scottish water industry: The scope for operating cost efficiency*, WICS, Volume 4.

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); and
- The short time that Scottish Water has had to mature and improve.

Chapter 10 of Volume 4⁹ of this methodology set out our initial views on each of these factors. We believe that some of these factors may impact upon the efficient level of investment.

The quality of the assets inherited by Scottish Water

Some argue that Scottish Water inherited assets of poor quality from the three former authorities. They assert that the inherited assets are generally in poor physical condition and perform badly, leading to higher operating and/or capital maintenance costs both to repair and to supervise the assets. Historic underinvestment in Scotland, relative to England and Wales, is cited as the root cause. In particular, it is claimed that Scotland has failed to match the levels of investment that have been delivered by the companies since privatisation in 1989.

On the basis of the evidence that Scottish Water has submitted so far, we do not agree with this assertion. In our *'Investment and Asset Management Report 2002-03'* we examined evidence on both the level of investment and the reported condition and performance of Scottish Water's assets. This evidence points to comparable levels of investment in Scotland and in England and Wales, and assets of comparable condition, for most categories of assets.

Public and private sector ownership

There is a claim that our reliance on comparisons with private companies to induce increased efficiency from the management of Scottish Water, which is a public body, has no basis in economic theory¹⁰.

We are not aware of any economic studies that have found any conclusive evidence that the type of ownership determines the efficiency of a water and wastewater business¹¹.

We see no reason why customers in Scotland should be disadvantaged because of perceived constraints of operating in the public sector. We will, however, review any evidence presented by Scottish Water that could justify a relatively higher level of capital expenditure compared with a private company.

Conclusion

We propose to continue to assess the efficiency of Scottish Water relative to the companies in England and Wales. We will, however, identify and quantify adjustments for any special factors that Scottish Water demonstrates are not covered, or are inadequately covered, in our benchmarking.

13.10 Other regulators' approaches to special factors

Ofwat

Ofwat uses special factors in order to adjust for any circumstances that could be considered to be company

⁹ *'Our work in regulating the Scottish water industry: The scope for operating cost efficiency'*, WICS, Volume 4.

¹⁰ J Findlay, *'Financing the Scottish water and sewerage industry'*, paper to the Scottish Trades Union Conference, April 2004

¹¹ See Chapter 6.

specific and which cannot be incorporated into its benchmarking tools. These factors must be beyond management control.

In its 2002-03 report, 'Water and sewerage service unit costs and relative efficiency', Ofwat published the special factors that it had allowed for operating expenditure and capital maintenance expenditure. Twenty-one companies submitted more than 150 special factors. Table 13.1 summarises the special factors that were taken into account by Ofwat when it assessed relative efficiency.

Table 13.1: Special factors taken into account by Ofwat

Special factor	Number of companies	
	Operating expenditure	Capital maintenance expenditure
Water resources (including bulk supplies)	7	0
Water quality	3	0
Water treatment	5	0
Leakage in north London	1	0
High level of meter penetration	5	0
Sewage treatment and sludge	2	0
Location		
Regional salaries and construction costs	5	6
Regional power costs	3	0
Debt	3	0
Coastal sewage treatment works	2	0
Traffic congestion	2	0
Burst rate	2	0
Size and number of assets (including rurality)	5	0
Company size (small companies)	3	2
Impact of large industrial customers on the econometric models	2	0
Total	50	8

Of more than 150 claims that were submitted, only 58 were considered to genuinely impact on costs. Of those 58, only 8 related to capital expenditure.

Ofwat's December 2004 publication 'Future water and sewerage charges 2005-10: Final determinations' also included information regarding the special factors that it has taken into account in the cost base¹². The only factor that was allowed related to regional price variation

factors (particularly in areas in and around London). Some companies claimed that their construction, tender and labour costs are higher than those of other companies because of their location in the country. Ofwat accepted this argument, which was backed up by independent research, and adjusted downwards these companies' standard costs. This adjustment was made before the benchmarks were chosen. This adjustment therefore improved the comparability of costs and the robustness of the relative efficiency assessment.

Ofgem

In Volume 4¹³, we noted that Ofgem takes account of special factors in its assessment of relative efficiency in operating costs. The same is true for capital expenditure.

Ofgem developed models to assess the future level of capital expenditure in two areas – load related expenditure (LRE) and non-load related expenditure (NLRE). In the case of NLRE, a set of unit costs was developed and applied to the asset replacement profile of each distribution network operator. The same set of unit costs was applied to each operator, with the exception of EDF-LPN. In this case Ofgem adjusted unit costs to reflect regional factors. It would appear that the adjustment was designed to allow for higher costs in the London area. No other operator received such an adjustment for capital expenditure.

ORR

In its 2003 review of access charges, ORR assessed the scope for annual reductions in Network Rail's unit costs in three areas – maintenance, renewals and controllable operating expenditure. ORR used intra-company benchmarking. Network Rail is organised into seven regions. ORR believed that savings could be made through the less efficient regions reducing their costs to levels that were comparable to the more efficient regions. ORR did make allowances for regional variations in costs that are beyond management's control in establishing the most efficient regions.

¹² Ofwat, *Future water and sewerage charges 2005-10 – Final determinations*, December 2004, Appendix 2.

¹³ 'Our work in regulating the Scottish water industry: The scope for operating cost efficiency', WICS, Volume 4, Chapter 10, page 9.

Regulators do make some allowance for special factors that impact on capital expenditure. These allowances tend to focus upon regional price variations.

We propose to assess whether regional price variations have an effect upon Scottish Water's reported capital investment costs. If necessary, we propose to make an appropriate adjustment to Scottish Water's costs.

13.11 Criteria for assessing special factor claims

We propose to assess special factors for capital expenditure in the same way as we assess special factors for operating expenditure. We set out the criteria that we propose to use in Chapter 10 of Volume 4 of this methodology¹⁴. In summary, to justify an adjustment to a special factor Scottish Water has to provide evidence in the following areas:

- What is the justification for the special factor? Scottish Water will need 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 water and wastewater 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?

Scottish Water's first draft business plan submitted in October 2004 included a draft submission on special factors. This submission related only to operating expenditure. Scottish Water has not yet submitted any claims for special factors relating to capital expenditure.

We understand that Scottish Water has included regional 'uplift' factors in its investment plan costings. These add to the overall project cost estimates.

In the *Strategic Review of Charges 2006-10*, we will assess the justification for any special factor claims made by Scottish Water. In particular we will closely examine the justification for increasing the cost of the investment programme.

13.12 Summary

Efficiency is key to ensuring that customers receive value for money. It is important that our assessment of Scottish Water's capital expenditure efficiency is accurate. We propose to use robust analytical techniques and make appropriate adjustments to ensure that our conclusions are reliable.

13.13 Questions for consultation

1. Do respondents agree that there are benefits in using Ofwat's benchmarking techniques to assess the scope for Scottish Water to improve its capital efficiency?
2. What are respondents' views on our proposed use of Ofwat's econometric models and cost base technique as the basis for establishing an efficient level of capital maintenance expenditure for Scottish Water? In particular, do our proposed adjustments to the econometric models appear appropriate? Are there other factors we should take into account?
3. What are respondents' views on our proposed use of the cost base as the basis for establishing an efficient level of capital enhancement spend?
4. Are our proposed mechanisms for taking account of 'special factors' appropriate?

¹⁴ 'Our work in regulating the Scottish water industry: The scope for operating cost efficiency', WICS, Volume 4, Chapter 10, page 90

Section 4: Chapter 14

Scope for and pace of improvement

14.1 Introduction

In previous chapters we outlined how we will ensure that Scottish Water's proposed capital investment delivers value for money. We propose to:

- establish a detailed list of projects, their outputs and clear deadlines for delivery;
- review the proposed investment programme and seek endorsement of the programme from the water quality and environmental regulators; and
- benchmark the cost of the programme against other water and wastewater companies.

In this chapter we describe how we propose to assess the scope for improvement. We also describe how we will determine the pace at which this improvement should be achieved.

The chapter begins by briefly outlining our approach at the *Strategic Review of Charges 2002-06*. We then review the performance of the companies in England and Wales, and examine the evidence available on the scope for future improvements within the industry. This will focus on work carried out for Ofwat by Europe Economics and London Economics.

The chapter concludes by explaining how we intend to determine the pace at which Scottish Water should improve its performance in delivering capital expenditure.

14.2 Our assessment of the scope for improvement in the last Strategic Review of Charges

It appears increasingly likely that the *Quality and Standards II* investment programme will not have been delivered in full by April 2006. At the time of writing we have not been able to quantify the extent of *Quality and Standards II* that will remain undelivered. Our analysis of the first *Quality and Standards II* projects to have been

completed also suggests that the capital efficiency targets set in the *Strategic Review of Charges 2002-06* may not be met.

At the *Strategic Review of Charges 2002-06*, we analysed the performance of the three former authorities in delivering capital investment. Our analysis showed¹ that Scottish Water lagged significantly behind the companies in England and Wales. We set efficiency targets for Scottish Water which reflected our assessment of the scope for improvement.

We set a single target for overall capital investment efficiency for each year of the regulatory control period. We did not set separate targets for capital maintenance and capital enhancement expenditure, nor for water and wastewater. This allowed Scottish Water additional flexibility in determining how best to meet the capital efficiency targets.

The profile of efficiency savings that we expected Scottish Water to achieve is shown in Table 14.1.

Table 14.1: Capital efficiency targets set in the Strategic Review of Charges 2002-06

	2002-03	2003-04	2004-05	2005-06
Cumulative efficiency gains (including efficiency savings claimed by East of Scotland Water Authority)	18%	24%	28%	34%

We set efficiency targets such that if Scottish Water achieved the target it would have closed 80% of the assessed efficiency gap by 2005-06.

It is important to emphasise what we mean by efficiency.

We define efficiency as:

- delivering the same level of investment outputs for less expenditure; or
- delivering a higher level of outputs for the same expenditure.

¹ *Strategic Review of Charges 2002-06*, Section 4, Chapter 19, 'The scope for capital efficiency'.

² In its submissions for the *Strategic Review of Charges 2002-06*, East of Scotland Water Authority argued that it had included £114 million (pre-efficiency) of capital efficiency savings in its investment proposals. Subsequently, in the absence of evidence supporting this claim, an agreement was reached between Scottish Water and this office about how these claimed efficiency savings would be recovered during the 2006-10 regulatory period. See also Chapter 7 of this document.

At the *Strategic Review of Charges 2002-06*, our primary focus was on the former, ie delivering the same level of outputs that was originally proposed in the *Quality and Standards II* process, but for a lower level of expenditure³.

In the *Strategic Review of Charges 2006-10*, we propose to focus on ensuring that more outputs are delivered for the same level of investment expenditure.

14.3 Improvements in the capital expenditure efficiency of the water industry in England and Wales

The water and wastewater companies in England and Wales were privatised in 1989. In the 15 years since then, they have achieved considerable savings in both operating and investment expenditure. Ofwat continues to set efficiency improvement targets for the industry. This would suggest that scope for efficiency remains.

In its first price review in 1994, Ofwat estimated that there was significant scope for efficiency in capital expenditure. The targets it set are outlined in Table 14.2.

Table 14.2: Capital efficiency targets set by Ofwat in the 1994 price review

	Minimum		Maximum	
	% per year	Five-year total	% per year	Five-year total
Water infrastructure	1%	4.9%	1.9%	9.1%
Water non-infrastructure	1%	4.9%	1.8%	8.5%
Wastewater infrastructure	1%	5.0%	1.9%	9.0%
Wastewater non-infrastructure	1%	4.9%	1.6%	7.7%

The industry outperformed these assumptions.

The efficiency targets comprised two elements:

- an overall improvement in the efficiency of the industry; and
- a 'catch-up' factor which all companies, bar the leading company, had to achieve.

In the 1994 price review, the catch-up factor was set at 50% of the gap to the leading company.

At the 1999 price review, Ofwat concluded that there was still significant scope for efficiency in capital expenditure. It set efficiency targets to close the gap between the least efficient companies and those at the efficiency frontier. This is illustrated in Table 14.3.

Table 14.3: Catch-up factor set by Ofwat in the 1999 price review

	Catch-up factor
Capital maintenance expenditure	40% - 50%
Capital enhancement expenditure	75%

The range of efficiency targets that were set at the 1999 review were as set out in Table 14.4.

Table 14.4: Efficiency targets set by Ofwat in the 1999 price review

	Range	Average
Water service		
Capital maintenance	3% - 14%	10%
Capital enhancement	9% - 24%	13%
Sewerage service		
Capital maintenance	4% - 16%	12%
Capital enhancement	7% - 19%	13%

Ofwat set targets that were significantly lower than the actual assessed efficiency gap. This was designed to create an incentive for the companies to beat the targets.

Ofwat recently published its final determinations for the water and sewerage companies⁴. The final determination set out:

- what Ofwat believes is the scope for efficiency savings in capital expenditure; and
- what it has set as the efficiency targets in capital expenditure.

These are set out in Table 14.5.

³ The *Quality and Standards II* investment programme was originally costed at £2.3 billion. In the *Strategic Review of Charges 2002-06* the target for delivery of this programme was set at £1.8 billion.

⁴ Ofwat, 'Future water and sewerage charges 2005-10: Final determinations', December 2004.

Table 14.5: Ofwat targets set in the 2004 final determinations

	Scope for efficiency savings	Efficiency targets
Water service – capital maintenance	17.0%	7.9%
Water service – capital enhancement	18.2%	11.9%
Sewerage service – capital maintenance	18.8%	9.2%
Sewerage service – capital enhancement	20.0%	12.9%

Ofwat allows the companies significant scope to outperform the efficiency targets. It has continued to allow greater scope in capital maintenance than in capital enhancement expenditure.

The companies have been successful in meeting, and outperforming, the relatively challenging efficiency targets that Ofwat set in its previous price reviews. Given our assessment of the efficiency gap at the last *Strategic Review of Charges*, this would indicate that there is significant scope for Scottish Water to improve its efficiency in capital expenditure.

14.4 Industry-wide scope for productivity improvement

During the 2004 price review, Ofwat commissioned two studies to examine the potential scope for efficiency improvement in the water industry. These studies were carried out by Europe Economics⁵ and London Economics⁶.

The Europe Economics report

The Europe Economics study updated and expanded on work that it had carried out for Ofwat as part of the 1999 price review. The updated study was published in March 2003.

Europe Economics adopted a top-down approach to assess the scope for efficiency improvement in the water and sewerage industry in England and Wales over the period 2003-13. Essentially, this approach involved comparing the water and sewerage companies with:

- sectors of the economy that have similar activities to the water and sewerage companies; and
- other UK privatised infrastructure companies since their privatisation.

The study compared productivity trends in the water and sewerage companies in England and Wales against the same trends in the two groups of comparators. Comparison against the first group appeared to indicate that as a result of the nature of their businesses, water and sewerage companies do have further scope to improve their efficiency faster than the economy as a whole. Comparison against other privatised infrastructure companies indicated that these companies had reduced costs by more than might have been expected. The study suggested that the privatisation of the water and sewerage companies may have led directly to improved performance and it seems likely that incentive regulation had also played a part. The study found that it was difficult to forecast whether such outperformance would continue in the future.

Europe Economics made clear that the study related “to the totality of base service expenditures, comprising both operating expenditure and capital maintenance expenditure...”⁷. As a result, the study took into account improvements in customer service and delivery of higher water and environmental quality standards. It was essential that these changes were taken into account, otherwise the improvement in productivity achieved by the industry would be underestimated.

The comparisons of productivity trends allowed Europe Economics to forecast the scope for efficiency improvements in the water and sewerage industry in England and Wales for the period 2003-13. Europe Economics concluded that the companies in England and Wales had scope to improve base service expenditure efficiency on a like-for-like basis by around 2%-3% per year. Table 14.6 summarises Europe Economics’ conclusions.

⁵ Europe Economics, ‘Scope for efficiency improvement in the water and sewerage industries: Final report’, March 2003.

⁶ London Economics, Black & Veatch Consulting and Professor Maurice F. Shuttler, ‘PR04 scope for efficiency studies’, December 2003.

⁷ Europe Economics, ‘Scope for efficiency improvement in the water and sewerage industries: Final report’, March 2003, page 3

Table 14.6: Europe Economics assessed scope for efficiency improvements

	Water	Wastewater
Scope for reductions in real base service operating and capital maintenance expenditure	1.5% to 3% per year	1.75% to 3.25% per year
Scope for reductions in real base service operating expenditure	2% to 4% per year	2.25% to 4.25% per year

Europe Economics' conclusions are not directly applicable in Scotland. They apply to the scope for improvement in companies that are more efficient than Scottish Water.

The London Economics report

This report was published in December 2003. Ofwat asked London Economics to look at the scope for future efficiency in the water and sewerage industry and to address criticisms of previous efficiency reports.

London Economics used two methods to arrive at its assessment of the scope for future efficiency – a top-down approach and a bottom-up approach. Table 14.7 summarises the conclusions of the study.

Table 14.7: Assessment of scope for capital expenditure efficiency – London Economics study

	Annual average reduction in real unit costs (%)	
	Top-down results	Bottom-up results
Capital expenditure – water	0.1% to 1.3%	1.1%
Capital expenditure – sewerage	0.1% to 1.3%	1.4%

The top-down approach was essentially similar to that used by Europe Economics in that it involved analysing past productivity trends in the water and sewerage industry and comparing these with similar industries. We discussed the top-down approach in detail in Chapter 11 of Volume 4. We highlighted two issues with the top-down approach:

- London Economics used information from the water and wastewater industry in the UK to assess past productivity trends; this included both Scotland and Northern Ireland. The inclusion of two areas that have not been subject to the same period of incentive

regulation as England and Wales raises the possibility that the achievements in England and Wales are underestimated; and

- London Economics acknowledged that it had made no allowance for improvements in customer service that have occurred in England and Wales since privatisation. This would potentially introduce a downward bias to the estimates.

London Economics' bottom-up approach focussed on:

- a review of past reports;
- an assessment of the potential for future efficiency savings from cost reducing technology and management practices;
- a review of the companies' 2003 cost base and annual return submissions; and
- an examination of the scope for efficiency in each area of the investment programmes contained within the companies' business plans.

London Economics found that opportunities for cost savings from new technologies appeared to be small (up to 0.5% a year) and that greater opportunities existed in the areas of procurement and management practices (0.25% to 1.25% per year). This view was consistent with the conclusions of the 1998 Babbie report⁸, which covered the period 2000-05.

There are two main factors that limit the applicability of London Economics' conclusions to the water industry in Scotland. First, London Economics' conclusions relate to companies that are likely to be more efficient in capital delivery than Scottish Water. London Economics found that the companies had achieved savings in the cost base of up to 4% per year in the five-year periods between price reviews in 1994, 1999 and 2004. However, London Economics concluded that this level of savings is unlikely to be sustained in the period to 2010.

⁸ Babbie Environmental, 'Report and opinion on the scope for widescale adoption of lower cost new technologies and practices in the water industry', December 1998.

We have not seen evidence that the water industry in Scotland has been able to achieve a similar sustained level of savings over the period from the early 1990s to the present day. As a result, it appears very likely that the scope for efficiency savings is greater in Scottish Water than in the companies in England and Wales.

The second factor is that London Economics derived its results by weighting the potential efficiency savings in each area of investment by the proportion of the capital programme assigned to that area.

The expenditure weightings used by London Economics in its report were taken from the companies' draft business plans. The scope for efficiency savings reported by London Economics is therefore not necessarily applicable to Scottish Water because the final composition of the investment programme in Scotland could be different from that in England and Wales.

14.5 Scope for improvement in investment performance by Scottish Water

We propose to take account of the following factors in determining the scope for Scottish Water to improve its capital efficiency:

- Evidence published by Ofwat relating to the performance of the water and wastewater industry in England and Wales in improving efficiency;
- Information from Ofwat and its consultants (such as Europe Economics and London Economics) regarding the scope for further improvement in England and Wales;
- Our view of Scottish Water's current performance. This will be informed by our analysis of the efficiency gap between Scottish Water and the companies in England and Wales; and
- Our view of the scope for Scottish Water to improve performance by adopting best practice techniques such as the UKWIR common framework⁹ and achieving economic levels of leakage.

⁹ See Chapter 3 of this document.

14.6 How quickly can this improvement be made?

We need to consider how quickly Scottish Water should be able to achieve the efficiency improvements. It is possible to conclude that the required efficiency improvements should be made from the start of the regulatory period as a 'step change'. However, it may be more appropriate to phase the efficiency improvements over the regulatory control period. We adopted the second approach at the last *Strategic Review of Charges*.

We are able to draw upon regulatory precedent in the water and wastewater industry to assess how quickly Scottish Water should be required to improve its efficiency. At its 1999 price review Ofwat set the companies two targets: It set all the companies (except the best performing company) a target to narrow the capital expenditure efficiency gap with the best performing company. Companies were required to achieve this target in the first year of the regulatory control period. Ofwat also set all the companies a target to improve their capital expenditure efficiency in each year of the regulatory control period. Ofwat expected the companies to achieve annual improvements of 1.4% for capital maintenance and 2.1% for capital enhancement.

Following Ofwat's price determination, two companies – Mid Kent Water and Sutton & East Surrey Water – appealed to the Competition Commission. The Competition Commission concluded that it was more appropriate to phase the catch-up in capital expenditure efficiency over the first three years of the regulatory control period. The Competition Commission made no distinction between capital maintenance and capital enhancement expenditure in terms of the rate of improvement that was expected. However, the Commission did agree with Ofwat's approach of setting the level of catch-up at 50% of the gap for capital maintenance and 75% of the gap for capital enhancement.

Ofwat modified its approach for the 2004 price review. In the final determinations, published this month, capital maintenance catch-up is phased evenly over the first

three years of the review period. This is consistent with the Competition Commission's approach. Ofwat decided not to phase capital enhancement catch-up.

We would welcome the views of stakeholders on the approach that we should adopt. Our preliminary view is that we should adopt the Competition Commission's approach and phase the required catch-up improvement over the first three years of the regulatory control period. This would give Scottish Water the opportunity to implement improvements in asset management techniques. We do not plan to distinguish between the scale and pace of improvement in capital maintenance and capital enhancement expenditure in setting targets. We believe that it is appropriate to set consistent targets for all elements of the programme, given the relatively short regulatory control period.

14.7 Incentives for improvement

The capital efficiency of the companies continues to improve. This continued improvement is due, at least in part, to the framework for incentive-based regulation. Ofwat seeks to minimise customers' bills by setting challenging targets which it believes a well-managed company should beat. Shareholders encourage outperformance of the regulatory settlement in order to improve the return on their investment.

The companies south of the border have, on average, always managed to outperform the targets set by Ofwat. During the period 1995-2000, the industry as a whole performed more than 10% better than the targets set by Ofwat. Not surprisingly given the extent of improvement since 1989, current levels of outperformance are rather lower.

Ofwat continues to set efficiency targets such that a well-managed company will outperform. The company can retain the benefits of outperformance for five years. At the end of five years, the benefits are transferred to customers¹⁰.

The incentive to outperform regulatory targets in the public sector model is different. We were keen to ensure that customers received the best value for money from the *Quality and Standards II* investment programme. The absence of a transparent incentive framework led us to seek to set a more challenging efficiency target for capital expenditure. Accordingly, in the *Strategic Review of Charges 2002-06*, we set Scottish Water capital efficiency targets that were designed to close 80% of the assessed efficiency gap with the companies in England and Wales. This approach increased slightly the size of the efficiency target. However, it is now clear that this approach underestimated the reduction in cost that was possible. This is because, at the last Review, we were unable to rely either on a robust baseline or Reporter challenge to ensure that the investment programme was properly costed and took full account of synergies.

As we explained in Volume 3, we believe that customers' interests would best be served by an incentive framework which encourages Scottish Water to exceed its regulatory targets. Such a framework needs to create a 'win-win' situation for customers and Scottish Water. The benefits for Scottish Water could involve direct incentives, such as staff bonuses, or trade-offs with other targets set for the business, such as operating cost efficiency targets. For customers, the benefits could include reduced prices and improved environmental, drinking water quality or customer service performance.

In the *Strategic Review of Charges 2006-10*, we propose to introduce an incentive framework that rewards Scottish Water for outperformance and provides benefits to customers and stakeholders. Under this framework, Scottish Water would be allowed to retain a proportion of any outperformance in delivering the agreed capital investment programme. Scottish Water would be able to use any such allowed outperformance to off-set the efficiency targets for operating expenditure.

The remainder of the outperformance would be used to deliver additional capital investment outputs identified by stakeholders¹¹. Scottish Water could take credit for

¹⁰ 'Our work in regulating the Scottish water industry: The scope for operating cost efficiency', WICS, Volume 4, October 2004, Chapter 4.

¹¹ 'Stakeholders here means the Scottish Ministers, the Scottish Executive, the Scottish Environment Protection Agency, the Drinking Water Quality Regulator and ourselves

adding outputs that were not funded in the original capital investment programme. We would ask the stakeholders to agree the projects to be funded.

We believe that this framework would be relatively straightforward to implement and that it would provide Scottish Water with an incentive to exceed its capital efficiency targets. If this incentive framework were supported by appropriate managerial incentives we would set targets that we believe Scottish Water should be able to outperform.

The details of this incentive framework would need to be developed during the *Strategic Review of Charges 2006-10*. We anticipate that Scottish Water should be allowed to retain between 25% and 50% of any outperformance. If a component of the programme valued at £100 million (post-efficiency) was delivered for £90 million, then Scottish Water would be able to retain between £2.5 million and £5 million. The remainder of the £10 million outperformance would be available to fund other investment priorities determined by the stakeholders.

Assessment of outperformance in delivering the investment programme is time-critical. If the elapsed time is too short, this could introduce a risk that outperformance on only a small sample of projects is rewarded. This may lead to early delivery of simple projects and delays to more difficult schemes. Too long an elapsed time may result in reduced incentives for Scottish Water and insufficient time to deliver the additional outputs. We would initially propose to review the extent of outperformance of delivery of the programme on an annual basis.

We believe that introducing incentive-based regulation should protect customers from the risk of underperformance by Scottish Water. This will only be achieved if the costs of such underperformance are met by a third party and at no cost to customers. In the public sector model this would require the Scottish Executive to provide grant-in-aid funds to make good these costs.

We believe that this should ensure that the Scottish Executive scrutinises Scottish Water's performance more rigorously; it will also be less likely to increase Scottish Water's borrowing in the event of a failure to meet targets. This would clearly be in customers' interests.

14.7 Summary

In this chapter we have described our proposed approach to assessing how quickly Scottish Water should improve its investment performance.

It is clear that Ofwat continues to believe that there is scope for further capital efficiency improvement in the water and wastewater industry south of the border. The companies have been successful in outperforming the relatively challenging efficiency targets that have been set in earlier price reviews. This would indicate that there is significant scope for Scottish Water to achieve further savings in investment performance.

We propose to adopt the Competition Commission's approach and phase the required catch-up improvement over the first three years of the regulatory control period. We note, however, that Ofwat has decided not to use this approach for capital enhancement expenditure.

In the *Strategic Review of Charges 2006-10*, we propose to introduce an incentive framework that rewards Scottish Water for outperformance on investment and provides benefits to customers and stakeholders. We also propose to establish the principle that undelivered investment outputs should not be funded a second time in future regulatory periods.

14.8 Questions for consultation

1. Do respondents agree with our proposed approach to establishing the scope for improvement in capital efficiency?
2. Do respondents consider that we should treat capital maintenance and capital enhancement expenditure separately?

3. Do respondents agree that our proposals for introducing an incentive mechanism for outperformance will be in the interests of customers and stakeholders? Does the proposed mechanism provide appropriate incentives for outperformance, and does it share the benefits fairly between Scottish Water and customers? If not, which other mechanism would be preferable?
4. Do respondents agree that any failure to meet efficiency targets should be funded by grant-in-aid from the Scottish Executive?

Section 4: Chapter 15

Setting targets for efficiency in capital expenditure

15.1 Introduction

Chapter 14 outlined how we propose to establish the scope for Scottish Water to improve its capital efficiency. In this chapter we set out how we propose to set a defined, efficient baseline for Scottish Water's capital investment programme for 2006-10.

We set targets that we believe are challenging but achievable. We monitor and report on the delivery of these targets to ensure that customers receive the promised benefits of the investment. In this chapter we set out our proposed framework for determining the defined, efficient baseline for the capital programme.

15.2 Issues that affect our approach to target setting

We need to take account of a range of issues that will affect Scottish Water's ability to deliver its capital investment programme efficiently. We have discussed these 'critical factors' in previous chapters. They are:

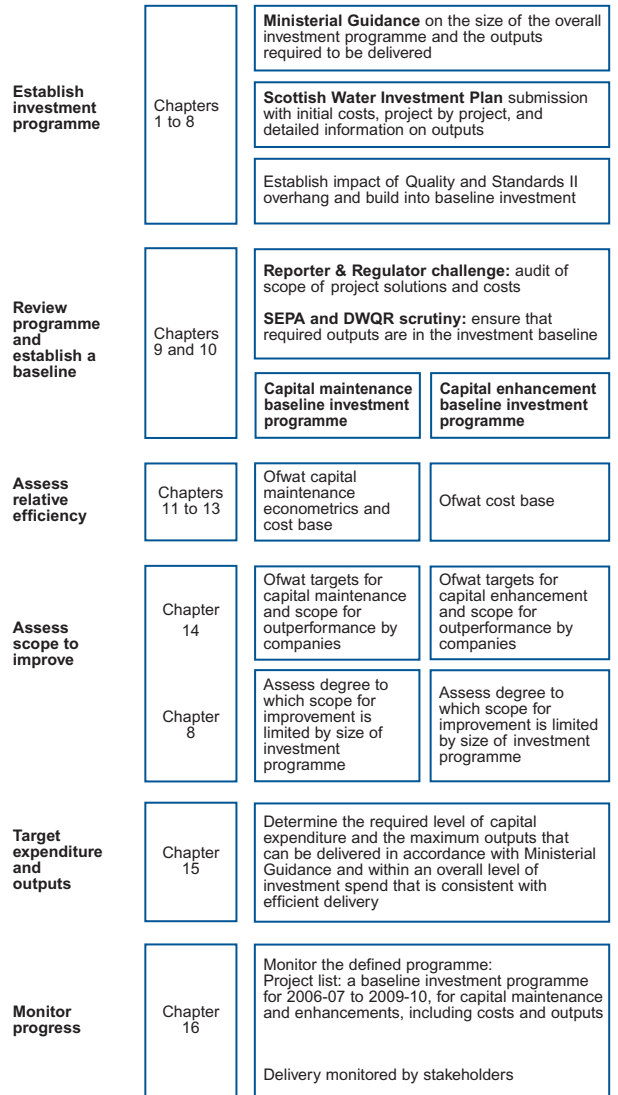
- the proportion of *Quality and Standards II* that will not have been delivered by March 2006;
- historical evidence on the size of investment programmes that are deliverable; and
- the incentive for Scottish Water to improve its performance.

15.3 Our proposed overall framework for setting targets

Our approach focuses on maximising the delivery of investment outputs, which have been identified as priorities by Ministers and stakeholders, within an overall level of investment spend that is consistent with efficient delivery.

We discussed the elements of this framework in earlier chapters. The overall framework is illustrated in Figure 15.1, along with the appropriate chapter references.

Figure 15.1: Framework for capital investment targets



15.4 Step-by-step process for setting targets

We propose to adopt a different approach to setting targets for capital efficiency in capital maintenance and in quality enhancement expenditure. In both cases, outperformance of targets will increase the resources available to add outputs to the baseline investment programme for the regulatory control period.

We propose to use the Ofwat cost base approach to assess the appropriate level of expenditure. We will

adjust downwards our estimate of the scope for efficiency if the proposed investment programme is too large.

We propose to use the Ofwat econometric models to assess the efficient level of capital maintenance expenditure for Scottish Water. We will adjust the results of the models to reflect any special factors that impact on Scottish Water's costs. We will also use the Ofwat cost base either to assess the scope for efficiency on the proposed capital maintenance programme or to assess whether we need to increase the capital maintenance allowance suggested by the adjusted econometric models to reflect the relative inefficiency of Scottish Water.

We set out our step-by-step process for each investment category below:

For both capital maintenance and capital enhancement

1. Establish a fully defined investment programme

Following Ministerial Guidance, Scottish Water will submit its investment plan in the agreed format for the second draft business plan. This format provides for a detailed list of projects and their associated outputs. It will also include a separate list that outlines in similar detail the proportion associated with *Quality and Standards II* projects that will not have been delivered by the end of March 2006. If we have been unable to reach agreement on the potential overhang by 28 January 2005 we will set an appropriate baseline.

2. Review the programme and establish a baseline

Scottish Water's investment plan will be scrutinised in detail by the Reporter, the quality regulators¹ and this office. We will determine whether the programme meets the objectives set out by Ministers. The output from this process will be a detailed baseline programme, which will list the projects required to deliver the investment requirements for capital maintenance and quality enhancement priorities.

For capital enhancement

3. Assess current efficiency gap

We will use Ofwat's cost base approach to determine the size of the procurement efficiency gap between Scottish Water and the companies in England and Wales.

4. Assess scope for further improvement

We will consider the scope for further improvement based on the targets set by Ofwat.

5. Establish the total allowable expenditure for capital enhancement

We will use the results of Steps 4 and 5 to establish the total allowable expenditure for quality enhancement for each year of the next regulatory period.

For capital maintenance

3. Estimate the annual efficient level of expenditure for Scottish Water, consistent with the companies' recent performance

We will use the capital maintenance econometric models developed by Ofwat to estimate the cost of maintaining serviceability of the current asset base at average levels of efficiency.

4. Adjust the results to take account of special factors

We will consider any representations from Scottish Water that would justify additional funding for specific capital maintenance objectives.

5. Check the adjusted results of the econometric models

We will carry out a series of high-level comparisons to check that the adjusted results of the models do not underestimate Scottish Water's capital maintenance requirements.

¹ SEPA and DWQR.

6. *Use the cost base approach to assess the current gap in capital expenditure efficiency*

We will use the cost base approach described in Chapter 11 to determine Scottish Water's current capital efficiency position.

7. *Assess the scope for further improvement*

We propose to take account of Ofwat's expectations for improvement in capital efficiency when we set targets. Ofwat has recently published its final determinations² and we will draw on the evidence accepted by Ofwat to inform our analysis of the further scope for improvement. This will inform the targets that we set for each year.

8. *Use the cost base results to set an appropriate level of capital maintenance spending*

There are two ways in which we can use the results of the cost base analysis. Our approach will depend on the level of detail that Scottish Water is able to provide on its proposed capital maintenance investment programme.

If we consider that the programme is sufficiently detailed, we would propose to apply an efficiency target (calculated by analysis of the cost base) to the capital maintenance programme planned by Scottish Water.

If we conclude that the programme is insufficiently detailed, we would use the results of the cost base to increase the adjusted allowance for capital maintenance that is suggested by Ofwat's econometric models.

9. *Set total level of capital expenditure and final baseline of projects with associated outputs*

We will set a total allowance for capital expenditure and a detailed list of projects with associated outputs. This will be the baseline against which we would expect stakeholders and customers to monitor and judge Scottish Water's performance.

15.5 Summary

Setting challenging but achievable targets benefits customers and stakeholders. It should result in more effective investment, delivered at lower cost.

We have set out our proposed step-by-step approach by which we will arrive at the total allowable investment expenditure for each year of the next regulatory control period. Our view is that the approach provides a robust set of targets for investment delivery against which we can monitor Scottish Water's performance in the next regulatory control period.

15.6 Questions for consultation

1. Do respondents think that our proposed methodology for setting targets is robust?
2. Do respondents agree that we should take account of the 'critical factors' we have listed (*Quality and Standards II* overhang, limitations on the size of the programme and incentives to outperform) in setting investment targets for Scottish Water? Are there any other factors that we should take into account?
3. Do respondents think that the scope for improvement is different between capital maintenance and capital enhancement and between water and sewerage?

² *Future water and sewerage charges 2005-10* – Final determinations

Section 4: Chapter 16

Monitoring capital delivery

16.1 Introduction

We believe that monitoring and reporting on Scottish Water's performance in achieving targets is critical to ensuring that customers receive value for money. Our regular reports on Investment and Asset Management provide customers and stakeholders with an objective assessment of the performance of Scottish Water.

In earlier chapters we discussed the importance of establishing a baseline capital investment programme against which Scottish Water's capital investment performance can be monitored. In this chapter we discuss in more detail how we propose to do this.

Our monitoring will:

- establish how much Scottish Water spends each year on the projects that comprise its capital investment programme; and
- assess Scottish Water's progress in delivering the investment outputs defined in the baseline programme.

We are already monitoring Scottish Water's capital expenditure in this current regulatory control period and are assessing its efficiency and effectiveness. We do this by comparing Scottish Water's performance against the targets set in the *Strategic Review of Charges 2002-06*. These targets require Scottish Water to deliver the *Quality and Standards II* investment programme, originally costed at £2.3 billion, for £1.8 billion.

The baseline programme for the next regulatory control period will include any undelivered element from the *Quality and Standards II* investment programme. It will also include the investment required to meet the objectives set by Ministers for *Quality and Standards III*.

Our proposal to channel any outperformance of the capital programme into investment in additional outputs will require more detailed annual assessment of the level of efficiency achieved by Scottish Water.

This chapter outlines:

- the current framework for monitoring Scottish Water's performance;
- our proposed monitoring framework for the *Strategic Review of Charges 2006-10*; and
- our proposed approach to monitoring the outputs of the investment programme.

16.2 The existing monitoring framework

In the *Strategic Review of Charges 2002-06* we set Scottish Water challenging, but achievable, efficiency targets for capital expenditure. These targets were phased. 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. It specifically does not involve delaying delivery of the outputs into subsequent periods. Nor does it involve simply not delivering the outputs.

During this current regulatory control period¹ we have established a 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 Return². 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 on progress with Scottish Water's investment programme. The Capital Investment Return (CIR) is submitted quarterly and it 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

¹ *Strategic Review of Charges 2002-06*

² The content of the Annual Return and the Capital Investment Return 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, from page .

the effectiveness and efficiency of Scottish Water. The CIR can also highlight 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).

- 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 resulting improvement in the quality of information supplied by Scottish Water.

- Audits of investment appraisal procedures

In the last *Strategic Review* we raised concerns about the level of scrutiny and challenge given by the former 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 7 we described how we had established a stakeholder forum to oversee development of the baseline investment programme for *Quality and Standards II*. The forum included representatives from Scottish Water, the Scottish Executive, the Scottish Environment Protection Agency (SEPA), the Drinking Water Quality Regulator (DWQR) and this office.

This forum developed a 'substitution' process which, through stakeholder agreement, allows projects to be removed from the programme and new projects added.

This monitoring framework allows us to assess Scottish Water's performance in delivering its 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 independent auditors, which are published by Ofwat;
- the companies' published regulatory accounts;
- Ofwat's published analysis of companies' progress; and
- the benchmarking tools³.

We publish the results of our assessment of Scottish Water's performance in capital expenditure efficiency in our annual Costs and Performance report.

16.3 Our monitoring framework for the Strategic Review of Charges 2006-10

This volume has described our proposed approach to setting the level of capital expenditure required by Scottish Water to meet the objectives set out by Ministers for the next regulatory control period.

Our current monitoring will need to be developed to take account of the proposals in this volume. Specifically, we will need to:

- make sure that we receive an independent assessment of Scottish Water's Capital Investment Returns;
- create a rigorous but flexible substitution process; and
- develop a process to assess the annual efficiency of the capital investment programme.

We propose to consult with stakeholders on developing an appropriate substitution process. This will draw on the substitution process that was developed for *Quality and Standards II*, but will be adapted to ensure that all of the agreed outputs for *Quality and Standards III* are delivered.

The process to assess the annual efficiency of the investment programme will also need to be developed in consultation with stakeholders, as well as determining

³ See Chapter 13.

how additional outputs will be added to the baseline programme.

If Scottish Water underperforms against its targets, we believe that any element of non-delivery of the investment programme should be funded in future periods by grant funding (ie from the tax-payer), rather than from Scottish Water's customers.

We will continue to provide customers with transparent information about Scottish Water's performance in delivering the investment programme through our annual Investment and Asset Management reports. We also propose to publish in full the baseline investment programme. We will need to explain clearly that the baseline programme is subject to change.

16.4 Our proposed approach to monitoring the outputs of the investment programme

It is important that our monitoring can assess progress on Scottish Water's delivery of 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 customer service.

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. It is important that customers benefit from the targeted improvements. It is in the customers' interest that we ensure the full benefits of the investment programme are delivered.

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. The baseline programme will contain information on each capital enhancement project, including the expected outcome in terms of environmental benefit, water quality improvement or customer service enhancement. We propose to work

with SEPA and DWQR to confirm whether or not outputs have been delivered.

Capital maintenance objectives/outputs

To assess the 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'. As discussed in Chapter 3, 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. Table 16.1 provides a list of Ofwat's serviceability measures.

By considering the overall trends in these indicators over a number of years, it is possible to make a judgement as to 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 serviceability. It is likely that the objectives for the investment programme for the period 2006-10 set out by Ministers will also use serviceability measures to define the required level of performance.

We propose to collect information on 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.

Table 16.1: Ofwat's serviceability indicators

Serviceability indicator
Water infrastructure
Extent of low pressure problems
Number of bursts
Scale of interruptions of supplies to customers
Quality compliance
Water non-infrastructure
The number of water treatment works where enforcement action was considered because of contraventions of the coliforms standard
The percentage of the total number of determinations taken at water treatment works containing coliforms
Sewerage infrastructure
Properties flooded because of insufficient sewer capacity
Number of sewer collapses
Number of pollution incidents occurring at combined sewer overflows and sewers
Sewerage non-infrastructure
The percentage of sewage treatment works failing numeric consents
The percentage of equivalent population served by non-compliant works failing look-up tables consents

16.5 Stakeholder monitoring of investment delivery

We have described the framework by which our office will monitor Scottish Water's investment performance. It is also important that the key stakeholders are able to monitor investment delivery and manage the process of project substitution. We propose to share our analysis with the Scottish Executive and the quality regulators on a regular basis. It will be important that the stakeholder group works cohesively to ensure that the investment is delivered effectively and efficiently.

We believe that we should work closely to:

- review progress with delivery of 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.

16.6 Summary

In recent years we have established a 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 Capital Investment Return 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;
- consulting with stakeholders on the mechanism for treating outperformance of investment delivery;
- introducing a serviceability monitoring regime which is similar to that used by Ofwat; and
- extending the stakeholder forum to ensure detailed performance monitoring.

We will continue to publish reports on Scottish Water's progress, particularly with regard to the targets set in the final regulatory settlement. These reports will provide customers with a clear understanding of Scottish Water's performance in delivering water and wastewater services.

16.7 Questions for consultation

1. What are respondents' views on our proposed approach to monitoring Scottish Water's investment performance?
2. Is our regulatory reporting mechanism sufficient to meet the needs of both customers and stakeholders?

Appendix 1:

Investment plan definitions

Tables C and E: Investment plan column definitions

Introduction

Scottish Water's business plan should be accompanied by an investment plan, largely at individual project level (exceptions are described in the plan guidance). The investment plan comprises the following tables:

- Table C: Investment plan 2006 to 2014;
- Table E: Overhang of previous investment plan (ie previously approved Quality & Standards II projects which incur expenditure during the plan period).

We expect Scottish Water to retain the 2002-03 cost base from which the investment programme projects were costed. However, we require project costs to be inflated (using COPI) to average 2003-04 prices. This average should use the mean COPI index of 2003, quarters 2, 3 and 4 and 2004, quarter 1. Scottish Water should state in Table B7.14 the index value of COPI that it has used to rebase the investment programme costs.

All scheme costs should be in £ million, to three decimal places (dp).

Table C column definitions:

Section 1 - General project information:

Column No: 1	Column Title: Project Autocode
Units: n/a	Processing Rules: Input field

Definition:

This is the project code allocated to the project within the Scottish Water investment programme database. All codes should be mutually exclusive and should relate to discreet projects. All projects that have been disaggregated from other projects or schemes should have an audit trail that may, from time to time, be scrutinised by the Reporter.

Any projects contained in the *Quality & Standards II* project list and also (for whatever reason) in the list of projects for *Quality & Standards III* must have the same

project autocode in both submissions. *Quality and Standards II* projects must contain the same autocode as used in the WIC18 and Capital Investment Return submissions.

Column No: 2	Column Title: Project Title
Units: n/a	Processing Rules: Input field

Definition:

This is the project title used in the Scottish Water investment programme database. The project title should be mutually exclusive of all others in Tables C and E and should indicate the scope of work being undertaken. Any projects contained in the *Quality & Standards II* project list and also (for whatever reason) in the list of projects for *Quality & Standards III* must have the same project title in both submissions. *Quality and Standards II* projects must contain the same title as used in the WIC18 and Capital Investment Returns. The project title, wherever possible, should give some indication of the type of works to be undertaken as part of the project.

Column No: 3	Column Title: Water or Wastewater project (primary purpose)
Units: n/a	Processing Rules: Input field

Definition:

One of the primary purposes: 'water' or 'wastewater', should be entered to indicate whether the project falls under the water or wastewater function. Any cross-functional work will need to be split into: water *and* wastewater projects.

Column No: 4	Column Title: Project Classification 1
Units:	Processing Rules: Input field

Definition:

Enter only *one* of the following secondary purposes:

- capital maintenance
- quality
- supply/demand
- enhanced service.

For any combined projects, the dominant purpose should be entered.

Column No: 5	Column Title: Project Classification 2
Units: n/a	Processing Rules: Input field

Definition:

Enter one of the following secondary classifications, only if the project is estimated to total £100,000 total or less.

- Infra – IRE
- Infra – Non-IRE
- Non-infra.

For projects totalling more than £100,000 this cell should be left blank and the total project cost proportionately allocated by value across columns 6 (Infra – IRE), 7 (Infra – Non-IRE) and 8 (Non-infra).

Note: Infra, Non-infra, IRE and Non-IRE are defined in WICS Regulatory Accounting Rules 1.

Column No: 6	Column Title: Infra – IRE Proportion of Projects over £100k
Units: £m to 3 dp	Processing Rules: Input field

Definition:

For projects estimated to total more than £100,000, enter the proportion of the total cost attributable to Infra-IRE.

Note: Infra-IRE is defined in WICS Regulatory Accounting Rules 1.

Column No: 7	Column Title: Infra – Non-IRE Proportion of Projects over £100k
Units: £m to 3 dp	Processing Rules: Input field

Definition:

For projects estimated to total more than £100,000, enter the proportion of the total cost attributable to Infra – Non-IRE.

Note: Infra – Non-IRE is defined in WICS Regulatory Accounting Rules 1.

Column No: 8	Column Title: Non - Infra Proportion of Projects over £100k
Units: £m to 3 dp	Processing Rules: Input field

Definition:

For projects estimated to total more than £100,000, enter the proportion of the total cost attributable to Non-Infra.

Note: Non-Infra is defined in WICS Regulatory Accounting Rules 1.

Column No: 9	Column Title: Q&SIII Scenario (from which project was taken)
Units: Integer	Processing Rules: Input field

Definition:

During the establishment of investment priorities for the *Quality & Standards III* period, a range of scenarios was considered relating to the scope of outputs to be achieved by each project. **One** of the scenarios shown below should be entered as a single number (eg if the project has been selected from scenario 2, enter 2 into cell).

- Scenario 1: Do nothing option
- Scenario 2: Legislative 'do minimum'
- Scenario 3: Enhanced option
- Scenario 4: Aspirational option.

Column No: 10	Column Title: Current Project Status Code
Units: n/a	Processing Rules: Input field

Definition:

Enter one of the following WICS codes S0 to S11 to indicate the current project progress status. The equivalent Scottish Water capital expenditure approval stages are included for clarity.

WICS code	Definition	Scottish Water capital expenditure status
S0	Investment need recognised, but no specific project yet identified	
S1	Inception: project has been identified but no detailed appraisal has been completed	Capex 1 approval
S2	Appraisal: initial detailed appraisal has been completed	Capex 2 approval
S3	Project appraised and under development before construction	Capex 3 approval
S4	Planning approved	
S5	SEPA consent granted	
S8	Works under construction	
S10	Beneficial use achieved	Capex 5 approval
S11	Works and expenditure complete – project closed	

Column No: 11	Column Title: Forecast / Actual – Project CAPEX Approval (s3) Date
Units: mmm-yyyy	Processing Rules: Input field

Definition:

Enter the month and year at which it is forecast that the project will reach WICS project status code s3. This is the equivalent of Scottish Water's Capex 3 approval. For those programmes of work being reported as aggregated lines, leave cell blank.

Column No: 12	Column Title: Forecast / Actual – Project, Construction Start Date
Units: mmm-yyyy	Processing Rules: Input field

Definition:

Enter the month and year at which it is forecast that physical construction on the project site will start. For those programmes of work being reported as aggregated lines, leave cell blank.

Column No: 13	Column Title: Forecast / Actual – Project, Beneficial Use Date
Units: mmm-yyyy	Processing Rules: Input field

Definition:

Enter the month and year (eg mar-2008) that the project is either forecast to, or has actually achieved, beneficial use (ie project status S10).

'Beneficial use' means that the specified outputs of the project are available, and customers (or the environment) are able to enjoy the full benefit of the investment. In many cases beneficial use will occur some time before works and expenditure are complete and the project is closed (ie project status S11).

Column No: 14	Column Title: Project Location – Local Authority
Units: n/a	Processing Rules: Input field

Definition:

Enter the name of a single local authority within which the majority of the works are located. This information relates to the physical location of the works, **not** the location of the population served.

Column No: 15	Column Title: Population/population equivalent released from development constraints
Units: nr	Processing Rules: Input field

Definition:

This is the population or population equivalent released from development previously constrained by capacity limitations of Scottish Water's assets. This may be attributable to investment driven specifically by the release of development constraints or to incremental benefits of investment driven by other drivers (eg quality, capital maintenance, etc).

Section 2 - Project capital cost information:

Column No: 16	Column Title: Total Q&S III Project Cost
Units: £m to 3 dp	Processing Rules: Calculated field. The sum of columns 15 to 22 inclusive.

Definition:

This is the total capital cost of all projects within the *Quality and Standards III* period 2006-07 to 2013-14. Costs incurred in periods prior to and post this review period should **not** be included in this column.

Column No: 17	Column Title: Project Expenditure Pre 2006/07
Units: £m to 3 dp	Processing Rules: Input field

Definition:

Enter **any** expenditure incurred on an individual project prior to the start of the *Quality and Standards II* period (31 March 2006).

Column No: 18	Column Title: Project Expenditure Profile 2006/07
Units: £m to 3 dp	Processing Rules: Input field

Definition:

Forecast project expenditure during 2006-07

Column No: 19	Column Title: Project Expenditure Profile 2007/08
Units: £m to 3 dp	Processing Rules: Input field

Definition:

Forecast project expenditure during 2007-08.

Column No: 20	Column Title: Project Expenditure Profile 2008/09
Units: £m to 3 dp	Processing Rules: Input field

Definition:

Forecast project expenditure during 2008-09.

Column No: 21	Column Title: Project Expenditure Profile 2009/10
Units: £m to 3 dp	Processing Rules: Input field

Definition:

Forecast project expenditure during 2009-10.

Column No: 22	Column Title: Project Expenditure Profile 2010/11
Units: £m to 3 dp	Processing Rules: Input field

Definition:

Forecast project expenditure during 2010-11.

Column No: 23	Column Title: Project Expenditure Profile 2011/12
Units: £m to 3 dp	Processing Rules: Input field

Definition:

Forecast project expenditure during 2011-12.

Column No: 24	Column Title: Project Expenditure Profile 2012/13
Units: £m to 3 dp	Processing Rules: Input field

Definition:

Forecast project expenditure during 2012-13.

Column No: 25	Column Title: Project Expenditure Profile 2013/14
Units: £m to 3 dp	Processing Rules: Input field

Definition:

Forecast project expenditure during 2013-14.

Column No: 26	Column Title: Project expenditure post 2013/14
Units: £m to 3 dp	Processing Rules: Input field

Definition:

Any forecast expenditure on an individual project after the *Quality and Standards III* period ends on 31 March 2014.

Column No: 27	Column Title: Total Project Cost
Units: £m to 3 dp	Processing Rules: Input field

Definition:

This is the total cost of the project, irrespective of when the expenditure is incurred.

Section 3 - Project asset base valuation and operating expenditure information:

Column No: 28	Column Title: Impact of Project on Scottish Water's GEARC (Gross Equivalent Asset Replacement Cost)
Units: £m to 3dp	Processing Rules: Input field

Definition:

This is the forecast project impact on Scottish Water's total asset base valuation. This should be measured by the impact that the individual project will have on the Gross Equivalent Asset Replacement Cost (GEARC) of the total asset base.

This information will enable this Office to monitor changes made within the asset inventory and reconcile these to the developments in the investment programme as the period moves forward.

Column No: 29	Column Title: Impact of Project on OPEX
Units: £ per annum	Processing Rules: Input field

Definition:

This is the estimated impact that the project will have on average annual operating expenditure. This figure should be the net change in costs arising from new and improved assets, taking account of any savings. Operating expenditure cost savings may result from the operation of new/improved assets.

Section 4 – Capital maintenance information:

Column No: 30	Column Title: Proportion of Capital Maintenance Element of Project - £m
Units: £m to 3 dp	Processing Rules: Input field

Definition:

This is the proportion of the individual project cost that is ascribed to a capital maintenance driver. The proportion should be expressed financially as £m.

Column No: 31	Column Title: Proportion of Capital Maintenance Element of Project - %
Units: Percentage	Processing Rules: Input field

Definition:

This is the proportion of the individual project cost that is ascribed to a capital maintenance driver. The proportion should be expressed as a percentage of the total project budget in column 27.

Section 5 – Project driver information:

This section (columns 32 to 41 inclusive) requires drivers (after capital maintenance) to be proportionally allocated to individual projects. Where possible, drivers specified by stakeholders as part of the *Quality & Standards III* process have been used. Appendix A to these definitions contains lists of drivers and the codes that are to be used. These are the drivers upon which *Quality & Standards III* investment proposals were based (apart from capital maintenance), and only drivers contained in the lists should be used.

Column No: 32	Column Title: Primary Driver After Capital Maintenance
Units: n/a	Processing Rules: Input field

Definition:

Enter most relevant single driver code from those listed in Appendix A to these definitions.

Column No: 33	Column Title: Primary Driver % Allocation
Units: Percentage	Processing Rules: Input field

Definition:

Enter the percentage of project total value that is attributable to the primary driver in column 32.

Column No: 34	Column Title: Driver 2
Units: n/a	Processing Rules: Input field

Definition:

Enter the most relevant single driver code from those listed in Appendix A to these definitions.

Column No: 35	Column Title: Driver 2 - Percentage Allocation
Units: Percentage	Processing Rules: Input field

Definition:

Enter the percentage of project total value that is attributable to driver 2, in column 34.

Column No: 36	Column Title: Driver 3
Units: n/a	Processing Rules: Input field

Definition:

Enter the most relevant single driver code from those listed in Appendix A to these definitions.

Column No: 37	Column Title: Driver 3 Percentage Allocation
Units: Percentage	Processing Rules: Input field

Definition:

Enter the percentage of project total value that is attributable to the driver 3, in column 36.

Column No: 38	Column Title: Driver 4
Units: n/a	Processing Rules: Input field

Definition:

Enter the most relevant single driver code from those listed in Appendix A to these definitions.

Column No: 39	Column Title: Driver 4 Percentage Allocation
Units: Percentage	Processing Rules: Input field

Definition:

Enter the percentage of project total value that is attributable to driver 4, in column 38.

Column No: 40	Column Title: Driver 5
Units: n/a	Processing Rules: Input field

Definition:

Enter the most relevant single driver code from those listed in Appendix A to these definitions.

Column No: 41	Column Title: Driver 5 Percentage Allocation
Units: Percentage	Processing Rules: Input field

Definition:

Enter the percentage of project total value that is attributable to driver 5 in column 40.

Section 6 – Project output information:

This section (cols 42 to 56 inclusive) requires output information for individual projects. For simplicity, outputs have been assigned to the set of driver codes employed

above (as detailed in Appendix A). For each project line in the programme, the primary output should be identified and apportioned where appropriate over a maximum of four other outputs. Lists of output classifications are contained in Appendix B to this guidance. Only outputs contained in Appendix B should be used.

Column No: 42	Column Title: Primary Output Reference Code
Units: n/a	Processing Rules: Input field

Definition:

Enter a relevant driver code reference from Appendix B.

Column No: 43	Column Title: Primary Output Units
Units: as applicable	Processing Rules: Input field

Definition:

Enter the output units (from Appendix B) that correspond with the reference code in column 42.

Column No: 44	Column Title: Primary Output Value
Units: n/a	Processing Rules: Input field

Definition:

Enter the amount of the units specified in column 43 which the project aims to achieve.

Column No: 45	Column Title: Output 2 - Reference Code
Units: n/a	Processing Rules: Input field

Definition:

Enter a relevant driver code reference from Appendix B.

Column No: 46	Column Title: Output 2 - Units
Units: as applicable	Processing Rules: Input field

Definition:

Enter the output units (from Appendix B) that correspond with the reference code in column 45.

Column No: 47	Column Title: Output 2 - Value
Units: n/a	Processing Rules: Input field

Definition:

Enter the amount of the units specified in column 46 which the project aims to achieve.

Column No: 48	Column Title: Output 3 - Reference Code
Units: n/a	Processing Rules: Input field

Definition:

Enter a relevant driver code reference from Appendix B.

Column No: 49	Column Title: Output 3 - Units
Units: as applicable	Processing Rules: Input field

Definition:

Enter the output units (from Appendix B) that correspond with the reference code in column 48.

Column No: 50	Column Title: Output 3 - Value
Units: n/a	Processing Rules: Input field

Definition:

Enter the amount of the units specified in column 49 which the project aims to achieve.

Column No: 51	Column Title: Output 4 - Reference Code
Units: n/a	Processing Rules: Input field

Definition:

Enter a relevant driver code reference from Appendix B.

Column No: 52	Column Title: Output 4 - Units
Units: as applicable	Processing Rules: Input field

Definition:

Enter the output units (from Appendix B) that correspond with the reference code in column 51.

Column No: 53	Column Title: Output 4 - Value
Units: n/a	Processing Rules: Input field

Definition:

Enter the amount of the units specified in column 52 which the project aims to achieve.

Column No: 54	Column Title: Output 5 - Reference Code
Units: n/a	Processing Rules: Input field

Definition:

Enter a relevant driver code reference from Appendix B.

Column No: 55	Column Title: Output 5 - Units
Units: as applicable	Processing Rules: Input field

Definition:

Enter the output units (from Appendix B) that correspond with the reference code in column 54.

Column No: 56	Column Title: Output 5 - Value
Units: n/a	Processing Rules: Input field

Definition:

Enter the amount of the units specified in column 55 which the project aims to achieve.

Table E column definitions:

Section 1 - General project information:

Column No: 1	Column Title: Project Autocode
Units: n/a	Processing Rules: Input field

Definition:

This is the project code allocated to the project within the Scottish Water investment programme database. All codes should be mutually exclusive and relate to discreet projects. All projects that have been disaggregated from other projects or schemes should have an audit trail that may, from time to time, be scrutinised by the Reporter.

Any projects contained in the *Quality and Standards II* project list and also (for whatever reason) in the list of projects for *Quality & Standards III* must have the same project autocode in both submissions. *Quality and Standards II* projects must contain the same autocode as used in the WIC18 and Capital Investment Return submissions.

Column No: 2	Column Title: Project Title
Units: n/a	Processing Rules: Input field

Definition:

This is the project title used in the Scottish Water investment programme database. The project title should be mutually exclusive of all others in Tables C and E and should indicate the scope of work being undertaken. Any projects contained in the *Quality & Standards II* project list and also (for whatever reason) in

the list of projects for *Quality & Standards III* must have the same project title in both submissions. *Quality and Standards II* projects must contain the same title as used in the WIC18 and Capital Investment Returns. The project title, wherever possible, should give some indication of the type of works to be undertaken as part of the project.

Column No: 3	Column Title: Water or Wastewater project (primary purpose)
Units: n/a	Processing Rules: Input field

Definition:

One of the primary purposes: 'water' or 'wastewater', should be entered to indicate whether the project falls under the water or wastewater function. Any cross-functional work will need to be split into: water *and* wastewater projects.

Column No: 4	Column Title: Project Classification 1
Units:	Processing Rules: Input field

Definition:

Enter only *one* of the following secondary purposes:

- capital maintenance
- quality
- supply/demand
- enhanced service.

For any combined projects, the dominant purpose should be entered.

Column No: 5	Column Title: Project Classification 2
Units: n/a	Processing Rules: Input field

Definition:

Enter one of the following secondary classifications, only if the project is estimated to total £100,000 total or less.

- Infra – IRE
- Infra – Non-IRE
- Non-infra.

For projects totalling more than £100,000 this cell should be left blank and the total project cost proportionately allocated by value across columns 6 (Infra – IRE), 7 (Infra – Non-IRE) and 8 (Non-infra).

Note: Infra, Non-infra, IRE and Non-IRE are defined in WICS Regulatory Accounting Rules 1.

Column No: 6	Column Title: Infra – IRE Proportion of Projects over £100k
Units: £m to 3 dp	Processing Rules: Input field

Definition:

For projects estimated to total more than £100,000, enter the proportion of the total cost attributable to Infra-IRE.

Note: Infra-IRE is defined in WICS Regulatory Accounting Rules 1.

Column No: 7	Column Title: Infra – Non-IRE Proportion of Projects over £100k
Units: £m to 3 dp	Processing Rules: Input field

Definition:

For projects estimated to total more than £100,000, enter the proportion of the total cost attributable to Infra Non-IRE.

Note: Infra Non-IRE is defined in WICS Regulatory Accounting Rules 1.

Column No: 8	Column Title: Non - Infra Proportion of Projects over £100k
Units: £m to 3 dp	Processing Rules: Input field

Definition:

For projects estimated to total more than £100,000, enter the proportion of the total cost attributable to Non-Infra.

Note: Non-Infra is defined in WICS Regulatory Accounting Rules 1.

Column No: 9	Column Title: WIC 18 Budget
Units: £m to 3 dp	Processing Rules: Input field

Definition:

This should be the budget ascribed to the project in the agreed WIC18 baseline list of projects. This should **not**

be subject to any rebasing and should therefore be as given in the agreed WIC18 baseline.

Column No: 10	Column Title: Current Project Status Code
Units: n/a	Processing Rules: Input field

Definition:

Enter one of the following WICS codes S0 to S11 to indicate the current project progress status. The equivalent Scottish Water capital expenditure approval stages are included for clarity.

WICS code	Definition	Scottish Water capital expenditure status
S0	Investment need recognised, but no specific project yet identified	
S1	Inception: project has been identified but no detailed appraisal has been completed	Capex 1 approval
S2	Appraisal: initial detailed appraisal has been completed	Capex 2 approval
S3	Project appraised and under development before construction	Capex 3 approval
S4	Planning approved	
S5	SEPA consent granted	
S8	Works under construction	
S10	Beneficial use achieved	Capex 5 approval
S11	Works and expenditure complete – project closed	

Column No: 11	Column Title: Forecast / Actual – Project CAPEX Approval (s3) Date
Units: mmm-yyyy	Processing Rules: Input field

Definition:

Enter the month and year at which it is forecast that the project will reach WICS project status code s3. This is the equivalent of Scottish Water's Capex 3 approval. For those programmes of work being reported as aggregated lines, leave cell blank.

Column No: 12	Column Title: Forecast / Actual – Project, Construction Start Date
Units: mmm-yyyy	Processing Rules: Input field

Definition:

Enter the month and year at which it is forecast that physical construction on the project site will start. For those programmes of work being reported as aggregated lines, leave cell blank.

Column No: 13	Column Title: Forecast / Actual – Project, Beneficial Use Date
Units: mmm-yyyy	Processing Rules: Input field

Definition:

Enter the month and year (eg mar-2008) that the project is either forecast to, or has actually achieved, beneficial use (ie project status S10).

'Beneficial use' means that the specified outputs of the project are available, and customers (or the environment) are able to enjoy the full benefit of the investment. In many cases beneficial use will occur some time before works and expenditure are complete and the project is closed (ie project status S11).

Column No: 14	Column Title: Project Location – Local Authority
Units: n/a	Processing Rules: Input field

Definition:

Enter the name of a single local authority within which the majority of the works are located. This information relates to the physical location of the works, **not** the location of the population served.

Section 2 - Project capital cost information:

Column No: 15	Column Title: Total Q&S II Project Cost (2002/03-2005/06 inc)
Units: £m to 3dp	Processing Rules: Input field

Definition:

This is the total cost incurred by the project over the *Quality & Standards II* period 2002-03 to 2005-06 (inclusive).

Column No: 16	Column Title: Total Expenditure pre 2006/07
Units: £m to 3 dp	Processing Rules: Input field.

Definition:

This is the total of **any** costs incurred by an individual project prior to the start of the *Quality and Standards II* investment period (ie up to and including 31 March 2006).

Column No: 17	Column Title: Project Expenditure Profile 2006/07
Units: £m to 3 dp	Processing Rules: Input field

Definition:

Forecast project expenditure during 2006-07

Column No: 18	Column Title: Project Expenditure Profile 2007/08
Units: £m to 3 dp	Processing Rules: Input field

Definition:

Forecast project expenditure during 2007-08.

Column No: 19	Column Title: Project Expenditure Profile 2008/09
Units: £m to 3 dp	Processing Rules: Input field

Definition:

Forecast project expenditure during 2008-09.

Column No: 20	Column Title: Project Expenditure Profile 2009/10
Units: £m to 3 dp	Processing Rules: Input field

Definition:

Forecast project expenditure during 2009-10.

Column No: 21	Column Title: Project Expenditure Profile 2010/11
Units: £m to 3 dp	Processing Rules: Input field

Definition:

Forecast project expenditure during 2010-11.

Column No: 22	Column Title: Project Expenditure Profile 2011/12
Units: £m to 3 dp	Processing Rules: Input field

Definition:

Forecast project expenditure during 2011-12.

Column No: 23	Column Title: Project Expenditure Profile 2012/13
Units: £m to 3 dp	Processing Rules: Input field

Definition:

Forecast project expenditure during 2012-13.

Column No: 24	Column Title: Project Expenditure Profile 2013/14
Units: £m to 3 dp	Processing Rules: Input field

Definition:

Forecast project expenditure during 2013-14.

Column No: 25	Column Title: Project expenditure post 2013/14
Units: £m to 3 dp	Processing Rules: Input field

Definition:

Any forecast expenditure on an individual project after the *Quality and Standards III* period ends on 31 March 2014.

Column No: 26	Column Title: Total Project Cost
Units: £m to 3 dp	Processing Rules: Calculated field. The sum of columns 14 to 23 inclusive.

Definition:

This is the total cost of the project, irrespective of when the expenditure is incurred.

Section 3 - Project asset base valuation and operating expenditure information:

Column No: 27	Column Title: Impact of Project on Scottish Water's GEARC (Gross Equivalent Asset Replacement Cost)
Units: £m to 3dp	Processing Rules: Input field

Definition:

This is the forecast project impact on Scottish Water's total asset base valuation. This should be measured by the impact that the individual project will have on the Gross Equivalent Asset Replacement Cost (GEARC) of the total asset base.

This information will enable this Office to monitor changes made within the asset inventory and reconcile these to the developments in the investment programme as the period moves forward.

Column No: 28	Column Title: Impact of Project on OPEX
Units: £ per annum	Processing Rules: Input field

Definition:

This is the estimated impact that the project will have on average annual operating expenditure. This figure should be the net change in costs arising from new and improved assets, taking account of any savings. Operating expenditure cost savings may result from the operation of new/improved assets.

Section 4 – Capital maintenance information:

Column No: 29	Column Title: Proportion of Capital Maintenance Element of Project - £m
Units: £m to 3 dp	Processing Rules: Input field

Definition:

This is the proportion of the individual project cost that is ascribed to a capital maintenance driver. The proportion should be expressed financially as £m.

Column No: 30	Column Title: Proportion of Capital Maintenance Element of Project - %
Units: Percentage	Processing Rules: Input field

Definition:

This is the proportion of the individual project cost that is ascribed to a capital maintenance driver. The proportion should be expressed as a percentage of the total project budget in column 26.

Section 5 – Project driver information:

This section (columns 29 to 38 inclusive) requires drivers (after capital maintenance) to be proportionally allocated to individual projects. Where possible, drivers specified by stakeholders as part of the *Quality & Standards III* process have been used. Appendix A to these definitions contains lists of drivers and the codes that are to be used. These are the drivers upon which *Quality & Standards III* investment proposals were based (apart from capital maintenance), and only drivers contained in the lists should be used.

Column No: 31	Column Title: Primary Driver After Capital Maintenance
Units: n/a	Processing Rules: Input field

Definition:

Enter most relevant single driver code from those listed in Appendix A to these definitions.

Column No: 32	Column Title: Primary Driver % Allocation
Units: Percentage	Processing Rules: Input field

Definition:

Enter the percentage of project total value that is attributable to the primary driver in column 31.

Column No: 33	Column Title: Driver 2
Units: n/a	Processing Rules: Input field

Definition:

Enter the most relevant single driver code from those listed in Appendix A to these definitions.

Column No: 34	Column Title: Driver 2 - Percentage Allocation
Units: Percentage	Processing Rules: Input field

Definition:

Enter the percentage of project total value that is attributable to driver 2, in column 33.

Column No: 35	Column Title: Driver 3
Units: n/a	Processing Rules: Input field

Definition:

Enter the most relevant single driver code from those listed in Appendix A to these definitions.

Column No: 36	Column Title: Driver 3 Percentage Allocation
Units: Percentage	Processing Rules: Input field

Definition:

Enter the percentage of project total value that is attributable to the driver 3, in column 35.

Column No: 37	Column Title: Driver 4
Units: n/a	Processing Rules: Input field

Definition:

Enter the most relevant single driver code from those listed in Appendix A to these definitions.

Column No: 38	Column Title: Driver 4 Percentage Allocation
Units: Percentage	Processing Rules: Input field

Definition:

Enter the percentage of project total value that is attributable to driver 4, in column 37.

Column No: 39	Column Title: Driver 5
Units: n/a	Processing Rules: Input field

Definition:

Enter the most relevant single driver code from those listed in Appendix A to these definitions.

Column No: 40	Column Title: Driver 5 Percentage Allocation
Units: Percentage	Processing Rules: Input field

Definition:

Enter the percentage of project total value that is attributable to driver 5 in column 39.

Section 6 – Project output information:

This section (cols 39 to 53 inclusive) requires output information for individual projects. For simplicity, outputs have been assigned to the set of driver codes employed

above (as detailed in Appendix A). For each project line in the programme, the primary output should be identified and apportioned where appropriate over a maximum of four other outputs. Lists of output classifications are contained in Appendix B to this guidance. Only outputs contained in Appendix B should be used.

Column No: 41	Column Title: Primary Output Reference Code
Units: n/a	Processing Rules: Input field

Definition:

Enter a relevant driver code reference from Appendix B.

Column No: 42	Column Title: Primary Output Units
Units: as applicable	Processing Rules: Input field

Definition:

Enter the output units (from Appendix B) that correspond with the reference code in column 41.

Column No: 43	Column Title: Primary Output Value
Units: n/a	Processing Rules: Input field

Definition:

Enter the amount of the units specified in column 42 which the project aims to achieve.

Column No: 44	Column Title: Output 2 - Reference Code
Units: n/a	Processing Rules: Input field

Definition:

Enter a relevant driver code reference from Appendix B.

Column No: 45	Column Title: Output 2 - Units
Units: as applicable	Processing Rules: Input field

Definition:

Enter the output units (from Appendix B) that correspond with the reference code in column 44.

Column No: 46	Column Title: Output 2 - Value
Units: n/a	Processing Rules: Input field

Definition:

Enter the amount of the units specified in column 45 which the project aims to achieve.

Column No: 47	Column Title: Output 3 - Reference Code
Units: n/a	Processing Rules: Input field

Definition:

Enter a relevant driver code reference from Appendix B.

Column No: 48	Column Title: Output 3 - Units
Units: as applicable	Processing Rules: Input field

Definition:

Enter the output units (from Appendix B) that correspond with the reference code in column 47.

Column No: 49	Column Title: Output 3 - Value
Units: n/a	Processing Rules: Input field

Definition:

Enter the amount of the units specified in column 48 which the project aims to achieve.

Column No: 50	Column Title: Output 4 - Reference Code
Units: n/a	Processing Rules: Input field

Definition:

Enter a relevant driver code reference from Appendix B.

Column No: 51	Column Title: Output 4 - Units
Units: as applicable	Processing Rules: Input field

Definition:

Enter the output units (from Appendix B) that correspond with the reference code in column 50.

Column No: 52	Column Title: Output 4 - Value
Units: n/a	Processing Rules: Input field

Definition:

Enter the amount of the units specified in column 51 which the project aims to achieve.

Column No: 53	Column Title: Output 5 - Reference Code
Units: n/a	Processing Rules: Input field

Definition:

Enter a relevant driver code reference from Appendix B.

Column No: 54	Column Title: Output 5 - Units
Units: as applicable	Processing Rules: Input field

Definition:

Enter the output units (from Appendix B) that correspond with the reference code in column 53.

Column No: 55	Column Title: Output 5 - Value
Units: n/a	Processing Rules: Input field

Definition:

Enter the amount of the units specified in column 54 which the project aims to achieve.

Project driver codes

1 - Capital maintenance drivers

Driver code		Summary of requirements
WSI	Water Service Infrastructure	Maintain operational capability and performance of the asset as designed so that it achieves its original purpose.
WSNI	Water Service Non-Infrastructure	Maintain operational capability and performance of the asset as designed so that it achieves its original purpose.
WWI	Wastewater Service Infrastructure	Maintain operational capability and performance of the asset as designed so that it achieves its original purpose.
WWNI	Wastewater Service Non-Infrastructure	Maintain operational capability and performance of the asset as designed so that it achieves its original purpose.

2 – Drinking water quality drivers

Driver code	Summary of requirements	Date of compliance
DW1	Compliance with lead standard of 10mg/l set in EC Directive 98/83 on the quality of water intended for human consumption.	2013
DW2	Compliance with trihalomethane standard of 100mg/l.	2008
DW3	Compliance with all other standards contained in the Drinking Water Directive, including those below that may have been tightened under Directive 98/83/EC. Arsenic: tighter standard introduced which may result in local breaches. Bromate: tighter standard introduced which may result in local breaches. Copper: tighter standard introduced which may result in local breaches. pH: tighter standard introduced which may result in local breaches. Nitrate/Nitrite: the introduction of chloramination to meet the THM standard is likely to result in exceedences of the standard for nitrate/nitrite.	2013
DW4	Compliance with the Cryptosporidium (Scottish Water) Directions 2003 and any subsequent revisions including: i) annual risk assessments for all water supplies for the presence of Cryptosporidium; ii) installation of turbidity meters on all filters; iii) continuous monitoring of specific water supplies for Cryptosporidium.	
DW5	The quality of water put into supply must not be downgraded by the condition of the water mains through which it is supplied. In particular, the condition of a water main must not result in exceedences of the iron and manganese standards set in Directive 98/83/EC. Unplanned operational activity and maintenance work disrupt the flow in water mains and put water quality at risk.	2013

continued:

Driver code	Summary of requirements	Date of compliance
	Scottish Executive policy is that there should be no deterioration in the infrastructure asset stock.	
DW6	The Abstraction Directive	
DW7	The Birds Directive/The Habitats Directive	
DW8	Security of Supply	
DW9	Additional physical security arrangements to protect drinking water quality in accordance with guidance issued by Security Services.	
DW10	All public water supplies to meet standards set in Directive. Supplies to properties from raw water aqueducts and raw water mains are public supplies and must meet Directive standards.	
DW11	Investment necessary on Scottish Water assets to ensure Scottish Water compliance with Water Fittings Byelaws. (Note that this driver does not include the cost of ensuring third party Byelaw compliance.)	
DW12	Article 11 of the EC Directive 98/83 provides for a review of the annexes to the Directive every five years. The first such review commenced during 2003. There are strong indications that the standards for THMs, disinfection by-products will tighten.	2013
DW13	Improvements in aesthetic quality of drinking water.	
DW14	Extend provision of telemetry at water treatment works and service reservoirs.	
DW15	Compliance with recommendations made as a result of investigations into drinking water quality incidents in Scotland.	
DW16	Standards in the EC Directives are derived from World Health Organisation (WHO) Guideline Values. The WHO is now promoting Water Safety Plans as a means of ensuring drinking water quality. Such plans are already in use in many countries. It is likely that Water Safety Plans will feature in any revision of the Directive.	
DW17	The report into the Torry incident 1991 recommended removal of all cross-connections between water mains and sewers. However, this recommendation was not fully implemented across Scotland and many unsatisfactory arrangements remain. The risk posed by cross-connections is significant and any such arrangements remaining must be removed.	
DW18	Extend public water distribution network at "unreasonable cost" to provide a water supply to these areas because the level of return is not considered economic in relation to the capital investment required.	
DW19	The Water (Scotland) Act 1980 requires that Scottish Water shall provide a wholesome supply of water sufficient for the domestic purposes of all owners and occupiers of premises within their limit of supply.	
DW20	The Flood Estimation Handbook published by the Institute of Hydrology introduced a new method of calculating rainfall depth.	
DW21	Duplication of critical mains to provide security of supply.	
DW22	Provide treatment to address algae problems in raw water sources.	
WR1	UKTAG guideline abstraction thresholds (all Scottish Water surface and groundwater abstractions).	
WR2	Will require a site-specific review of operational practice at all Scottish Water reservoirs to compare with agreed best practice (all Scottish Water impoundments).	
WR3	Protect water quality in Drinking Water Protected Areas so as to avoid the need to increase the level of treatment needed to meet standards set in EC Directive 98/83 (all Scottish Water drinking water sources supplying more than 10m ³ /day or 50 people).	2013
WR4	Compliance with hydro-morphological standards in order to meet WFD ecological objective (all obsolete engineering works associated with abandoned water supply operations.)	
WR5	To demonstrate compliance with water quality licences (all Scottish Water abstractions and impoundments).	

3 – Environmental drivers

Driver code	UK Act/EC Directive
WQ01	Water Environment and Water Services Act 2002 (secondary legislation to replace Control of Pollution Act 1974, Section 34)
WQ02	Environment Act 1995, Section 34
ON01	Town and Country Planning (Scotland) Act 1997
ON02	Environment Protection Act 1990, Part III
LA01	Environmental Protection Act 1990, Part IIA (Contaminated Land)
NH01	Water Industry (Scotland) Act 2002, Section 54
SD01	Water Industry (Scotland) Act 2002, Section 51
WA01	Definition of Waste (Hazardous Waste Directive)
EC01	Urban Waste Water Treatment Directive (91/271/EEC)
EC02	Bathing Water Directive (76/160/EEC)
EC03	Shellfish Waters Directive (70/923/EEC)
EC04	Freshwater for Fish Directive (78/659/EEC)
EC05	Surface Water for Drinking Directive (75/440/EEC)
EC06	Sludge Use in Agriculture Directive (86/278/EEC)
EC07	Birds Directive (79/409/EEC)
EC08	Habitats Directive (92/43/EEC)
EC09	Dangerous Substances Directive (76/464/EEC)
EC10	Water Framework Directive (2000/60/EC)
EC11	Landfill Directive (99/31/EC)
EC12	Integrated Pollution Prevention & Control Directive (96/61/EC)
EC13	Waste Incineration Directive (2000/76/EC)
EC14	National Emissions Ceiling Directive (2001/81/EC)
EC15	Strategic Environmental Assessment Directive (2001/42/EC)
pEC16	Revised Bathing Water Directive (proposed)
pEC17	EU Marine Strategy (proposed COM/2002/539)
pEC18	Sludge Directive (proposed) & EC Soils Strategy
pEC20	Environmental Liability Directive (proposed)
IN01	OSPAR Convention 1992
XF01	Climate Change (Cross-functional)
XF02	Flooding (Cross-functional)

4 – Customer service drivers

Driver code	Driver description
CS1	Pressure. Removal of properties from the register of properties at risk from poor pressure.
CS2	Odour Management. Compliance with odour management standards.
CS4	Business Metering. Compliance with business metering standards.
CS5	Household Metering. Compliance with household metering standards.
CS6	Emergency Planning. Provision of improved emergency planning standards.
CS7	Business Billing. Provision of improved business billing facilities.
CS8	Household Billing. Provision of improved household billing services.
CS9	Customer Experience. Provision of improved customer service facilities.
CS11	Sewer Flooding. Removal of properties from at risk register.

Output measures and units

1 - Capital maintenance outputs

Driver code	Description of output	Output unit
WSI	Length of infrastructure relined/replaced	Km
WSNI	Throughput of works subject to maintenance	Ml/day
WWI	Length of infrastructure relined/replaced	Km
WWNI	Population equivalent of works subject to maintenance work	Number
SS	GEARC of assets subject to maintenance work	£

2 – Drinking water quality outputs

Driver code	Description of output	Output unit
DW1	Volume of water delivered to customers made compliant with the required standard	Megalitres/day
DW2	Volume of water delivered to customers made compliant with the required standard	Megalitres/day
DW3	Volume of water delivered to customers made compliant with the required standard	Megalitres/day
DW4	Volume of water delivered to customers made compliant with the required standard	Megalitres/day
DW5	Volume of water delivered to customers made compliant with the required standard	Megalitres/day
DW6	Number of sites made compliant with standard	Number
DW7	Number of sites made compliant with standard	Number
DW8	Number of sites made compliant with standard	Number
DW9	Number of sites made compliant with standard	Number
DW10	Volume of water delivered to customers made compliant with the required standard	Megalitres/day
DW11	Number of sites made compliant with standard	Number
DW12	Volume of water delivered to customers made compliant with the required standard	Megalitres/day
DW13	Volume of water delivered to customers made compliant with the required standard	Megalitres/day
DW14	Number of sites made compliant with standard	Number
DW15	Number of sites made compliant with standard	Number
DW16	Number of sites made compliant with standard	Number
DW17	Number of sites made compliant with standard	Number
DW18	Population equivalent benefiting from work	Population Equivalent
DW19	Population equivalent benefiting from work	Population Equivalent
DW20	Number of sites made compliant with standard	Number
DW21	Km of critical mains duplicated	Km
DW22	Number of sites made compliant with standard	Number
WR1	Number of sites made compliant with standard	Number
WR2	Number of sites made compliant with standard	Number
WR3	Number of sites made compliant with standard	Number
WR4	Number of sites made compliant with standard	Number
WR5	Number of sites made compliant with standard	Number

3 – Environmental outputs

Driver code	Description of output	Output unit
WQ01	Population equivalent benefiting from work	Population equivalent
WQ02	Population equivalent benefiting from work	Population equivalent
ON01	Number of sites made compliant with standard	Number
ON02	Number of sites made compliant with standard	Number
LA01	Number of sites made compliant with standard	Number
NH01	Number of sites made compliant with standard	Number
SD01	Number of sites made compliant with standard	Number
WA01	Number of sites made compliant with standard	Number
EC01	Population equivalent benefiting from work	Population equivalent
EC02	Population equivalent benefiting from work	Population equivalent
EC03	Population equivalent benefiting from work	Population equivalent
EC04	Population equivalent benefiting from work	Population equivalent
EC05	Number of sites made compliant with standard	Number
EC06	Population equivalent benefiting from work	Population equivalent
EC07	Population equivalent benefiting from work	Population equivalent
EC08	Population equivalent benefiting from work	Population equivalent
EC09	Number of sites made compliant with standard	Number
EC10	Population equivalent benefiting from work	Population equivalent
EC11	Population equivalent benefiting from work	Population equivalent
EC12	Number of sites made compliant with standard	Number
EC13	Population equivalent benefiting from work	Population equivalent
EC14	Population equivalent benefiting from work	Population equivalent
EC15	Number of sites made compliant with standard	Number
pEC16	Population equivalent benefiting from work	Population equivalent
pEC17	Population equivalent benefiting from work	Population equivalent
pEC18	Population equivalent benefiting from work	Population equivalent
pEC20	Number of sites made compliant with standard	Number
IN01	Number of sites made compliant with standard	Number
XF01	Number of sites made compliant with standard	Number
XF02	Number of sites made compliant with standard	Number

4 – Customer service outputs

Driver code	Description of output	Output unit
CS1	Removal of properties from the register of properties at risk from poor pressure.	Number of properties
CS2	Number of waste water treatment works made compliant with odour management standards.	Number of works
CS4	Number of meters made compliant with business metering standards.	Number of meters
CS5	Number of meters made compliant with household metering standards.	Number of meters
CS6	Customers subject to improved emergency planning standards.	Number of customers
CS7	Businesses subject to improved billing facilities.	Number of businesses
CS8	Households subject to improved billing services.	Number of households
CS9	Customers subject to improved customer service facilities.	Number of customers
CS11	Sewer flooding. Removal of properties from at risk register.	Number of properties

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