



Leakage and the  
efficient use of water

2000-2001 report

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This report records the performance of the water and sewerage companies in meeting leakage targets and carrying out their duty in respect of the efficient use of water. The report also includes details of the leakage targets for 2002-03.

For most companies 2000-01 was an unusual year. The fuel crisis, floods, freeze-thaw, and foot and mouth all made reducing and maintaining leakage more difficult. For some companies these events combined to cause them to miss their leakage targets.

For one company, Thames Water, outside factors cannot alone explain the deterioration in performance. We have set out here our reasons for concern and the steps to be taken by Thames Water to recover its position.

The National Audit Office published its report to the Public Accounts Committee (PAC) on leakage and water efficiency. We have acted on its recommendations.

Work has continued this year on the tripartite study (Ofwat, Department for Environment, Food and Rural Affairs, Environment Agency) into leakage best practice and target setting. The group hopes to publish the results of the study later this year.

We are satisfied, in the current context, that companies' plans for the promotion of the efficient use of water by their customers 2000-05 should allow them to fulfil their duty. The 2000-01 activity reported by companies is consistent with these strategies. However, we expect companies to take account of improved knowledge and evidence, as it becomes available, and reflect this in their strategies.

In particular, we expect companies to assess the role of the efficient use of water by customers within the framework of a long-term plan to balance supply and demand. Companies therefore need to ensure that their strategies focus on what works best.

We will continue to work with the industry to establish better information and improved understanding of the cost effectiveness of measures for the efficient use of water by customers.

PHILIP FLETCHER  
Director General of Water Services

# 1. LEAKAGE

## 2000-01 performance

Last year companies faced a difficult operating environment as they worked towards achieving 2000-01 leakage targets. Nearly all companies had to curtail some leakage control activities because of the autumn fuel crisis, and the floods in some parts of the country made leak detection and location more difficult. The combination of saturated soils and sudden drop in temperature over the New Year caused more problems. Finally, the foot and mouth epidemic brought access restrictions that had an impact on companies' ability to find and repair leaks.

Nevertheless, all but five companies were able to achieve their targets for 2000-01. And of the companies failing targets, three, (Severn Trent Water, Folkestone & Dover Water and Tendring Hundred Water) were able to show that their narrow failures were linked to the unusual operating conditions.

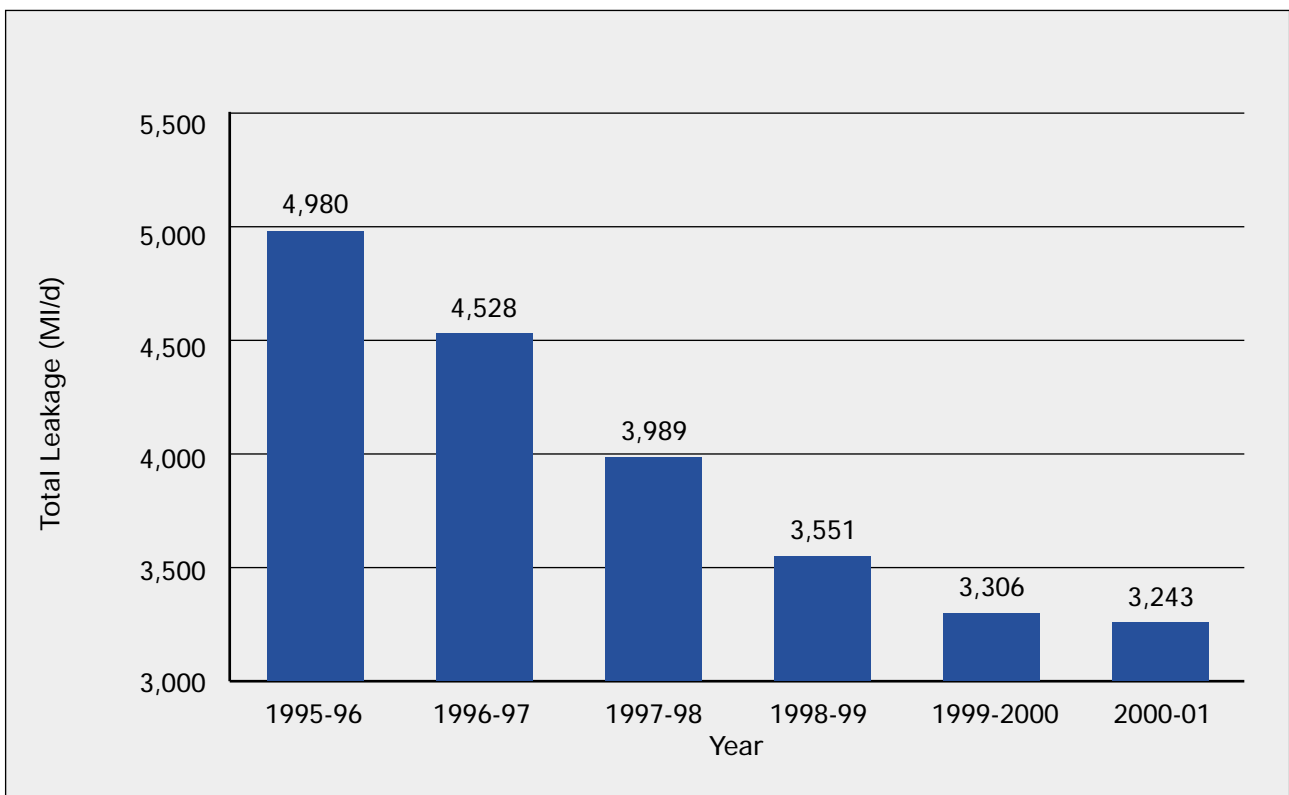
They are all now working to achieve the 2001-02 targets and will each supply us with an interim report on progress in the autumn.

South East Water, which also failed its target, is making good progress towards recovering from the problems reported last year despite the difficult conditions. It expects to meet its 2001-02 target.

The other company failing its target is Thames Water. Although the more difficult operating conditions have had some impact we are concerned that there are deeper and more significant problems. These and our strategy to resolve them are discussed on pages 12 and 13.

Despite the autumn/winter problems, and rising leakage at Thames Water, leakage has fallen by 63 MI/d<sup>1</sup> since 1999-2000. South East Water (12%), Dŵr Cymru (10%) and Dee Valley Water (8%) achieved the biggest reductions.

Figure 1 Total industry leakage 1995-96 to 2000-01



<sup>1</sup>MI/d = Megalitres per day; 1,000,000 litres per day.

In 2000-01, three companies reported quarterly to Ofwat because of previous problems. South East Water and Dee Valley Water have made good progress. Dee Valley Water will return to the annual reporting cycle whilst South East Water will provide a single interim report. Thames Water will continue to report quarterly until the problems there are resolved.

Bournemouth & W. Hampshire Water provided a single six-monthly report and having met the 2000-01 target will return to annual reporting.

Figure 1 and Table 1 show leakage levels since 1995-96. Table 1 apportion total leakage between distribution losses (leakage from the companies' distribution systems) and supply pipe leakage (from customers' underground supply pipes). Since its peak in 1994-95 leakage has fallen by 1,869 MI/d (37%), enough to supply

the daily needs of more than 12 million domestic customers. Tables 2a – 2c show companies' progress in reducing leakage between 1995-96 and 2000-01.

We show figures in terms of megalitres per day (MI/d), litres per property per day (l/prop/day) and cubic metres per kilometre of main per day (m<sup>3</sup>/km/d). We have not expressed leakage figures in terms of a percentage of distribution input, as this can mislead. An increase in consumption, for example because of a sustained hot, dry period, will appear to lead to an improvement in leakage levels while there has not been any reduction in the volume of water lost. Likewise, a successful efficient use of water campaign will reduce the amount of water put into supply and leakage will appear to increase.

Table 1 Components of leakage

		1995-96	1996-97	1997-98	1998-99	1999-2000	2000-01
Distribution	MI/d	3,685	3,295	2,955	2,618	2,431	2,365
losses	l/prop/d	163	145	129	114	105	102
	m <sup>3</sup> /km/d	11.5	10.3	9.1	8.0	7.4	7.2
Total supply	MI/d	1,295	1,233	1,034	933	875	878
pipe losses	l/prop/d	57	54	45	41	38	38
Total	MI/d	4,980	4,528	3,989	3,551	3,306	3,243
leakage	l/prop/d	221	199	174	154	143	139
	m <sup>3</sup> /km/d	15.6	14.1	12.3	10.9	10.1	9.8

Note:

Numbers may not add due to rounding.

Table 2a: Company estimates of total leakage (MI/d)

	1995-96	1996-97	1997-98	1998-99	1999-2000	2000-01
Water & sewerage companies						
Anglian	242	242	240	206	190	194
Dŵr Cymru	413	357	329	306	288	260
United Utilities	789	666	579	510	487	463
Northumbrian	190	192	184	171	168	164
Severn Trent	632	479	399	344	340	340
South West	142	129	101	91.6	83.7	83.6
Southern	120	113	98.8	94.8	92.7	91.7
Thames	1,110	1,080	906	770	662	688
Wessex	133	129	110	100	88.3	84.2
Yorkshire	495	430	377	342	317	304
WaSC total	4,260	3,820	3,320	2,940	2,720	2,670
Water only companies						
Bournemouth & W. Hampshire	27.5	28.5	26.3	25.7	22.7	22.5
Bristol	65.5	64.8	59.3	56.4	54.0	54.6
Cambridge	16.0	15.9	14.4	13.1	12.8	13.3
Dee Valley	14.6	13.0	12.2	11.9	12.5	11.6
Essex & Suffolk	90.3	84.8	82.2	76.4	73.4	72.4
Folkestone & Dover	12.7	11.6	8.71	8.71	8.47	8.60
Mid Kent	39.7	38.2	36.1	30.1	29.2	28.9
Portsmouth <sup>1</sup>	30.3	30.5	32.0	30.5	30.3	30.0
South East	94.2	98.8	108	97.6	96.6	85.4
South Staffs	92.9	90.1	81.8	77.1	75.6	72.2
Sutton & East Surrey	26.1	27.2	25.9	24.9	24.4	24.4
Tendring Hundred	6.38	6.32	5.75	5.49	5.39	5.45
Three Valleys <sup>2</sup>	199	199	172	157	145	140
WoC total	716	709	665	615	590	570
Industry total	4,980	4,530	3,990	3,550	3,310	3,240

Note:

All numbers are shown to three significant figures. Numbers may not add due to rounding.

<sup>1</sup> Portsmouth Water's 1997-98 leakage appears to have risen. This is because of data improvements and causes a data discontinuity for prior years.

<sup>2</sup> The entries for Three Valleys Water include the combined figures for Three Valleys Water and North Surrey Water.

Table 2b: Company estimates of total leakage (l/prop/day)<sup>1</sup>

	1995-96	1996-97	1997-98	1998-99	1999-2000	2000-01
<b>Water &amp; sewerage companies</b>						
Anglian	137	136	132	113	103	104
Dŵr Cymru	331	284	258	238	223	199
United Utilities	260	218	189	166	157	149
Northumbrian	172	174	165	153	149	145
Severn Trent	202	152	126	108	106	105
South West	208	188	146	131	118	117
Southern	125	116	101	96.4	93.7	92.1
Thames	331	321	267	227	193	200
Wessex	264	255	216	195	171	162
Yorkshire	244	211	184	165	152	146
WaSC average	239	213	184	162	148	145
<b>Water only companies</b>						
Bournemouth & W. Hampshire	152	157	144	140	123	121
Bristol	143	140	127	120	114	114
Cambridge	141	139	125	112	109	112
Dee Valley	131	117	108	105	110	100
Essex & Suffolk	124	116	111	102	98.2	96.4
Folkestone & Dover	182	165	123	123	119	120
Mid Kent	174	166	156	129	124	122
Portsmouth <sup>2</sup>	109	109	113	107	106	105
South East	169	176	189	170	167	147
South Staffs	176	170	154	144	141	134
Sutton & East Surrey	99.7	104	98.3	94.0	91.4	91.2
Tendring Hundred	94.6	93.4	84.4	80.3	78.5	78.8
Three Valleys <sup>3</sup>	169	168	144	131	120	116
WoC average	150	148	138	127	121	116
Industry average	221	199	174	154	143	139

Note:

All numbers are shown to three significant figures.

<sup>1</sup> Total connected properties is used as the denominator in these calculations.

<sup>2</sup> Portsmouth Water's 1997-98 leakage appears to have risen. This is because of data improvements and causes a data discontinuity for prior years.

<sup>3</sup> The entries for Three Valleys Water include the combined figures for Three Valleys Water and North Surrey Water.

Table 2c: Company estimates of total leakage (m<sup>3</sup>/km/d)<sup>1</sup>

	1995-96	1996-97	1997-98	1998-99	1999-2000	2000-01
<b>Water &amp; sewerage companies</b>						
Anglian	7.10	7.05	6.86	5.81	5.33	5.30
Dŵr Cymru	15.9	13.7	12.4	11.5	10.8	9.70
United Utilities	19.7	16.5	14.3	12.6	12.0	11.4
Northumbrian	11.6	11.8	11.2	10.3	10.1	9.80
Severn Trent	15.3	11.5	9.55	8.20	7.92	7.92
South West	9.23	8.57	6.82	6.18	5.63	5.60
Southern	9.17	8.56	7.48	7.15	6.97	6.88
Thames	35.5	34.6	28.8	24.4	20.9	21.6
Wessex	12.1	11.7	9.92	9.03	7.93	7.54
Yorkshire	17.3	14.9	12.4	11.1	10.2	9.82
WaSC average	16.6	14.8	12.7	11.2	10.3	10.0
<b>Water only companies</b>						
Bournemouth & W. Hampshire	10.2	10.5	9.56	9.33	8.21	8.13
Bristol	10.3	10.1	9.12	8.61	8.34	8.40
Cambridge	7.49	7.44	6.67	6.02	5.87	6.04
Dee Valley	7.45	6.60	6.17	6.01	6.43	5.89
Essex & Suffolk	11.1	10.3	9.84	9.08	8.67	8.65
Folkestone & Dover	12.5	11.5	8.39	8.34	8.05	8.11
Mid Kent	9.57	9.14	8.54	7.22	7.00	6.87
Portsmouth <sup>2</sup>	9.31	9.39	9.69	9.44	9.41	9.31
South East	10.3	10.6	11.0	9.94	9.80	8.94
South Staffs	16.5	15.9	14.4	13.5	13.2	12.5
Sutton & East Surrey	7.93	8.20	7.73	7.43	7.23	7.23
Tendring Hundred	6.74	6.66	6.31	6.11	6.02	6.08
Three Valleys <sup>3</sup>	14.7	14.6	12.6	11.4	10.5	10.1
WoC average	11.5	11.3	10.4	9.63	9.23	8.94
Industry average	15.6	14.1	12.3	10.9	10.1	9.83

Note:

All numbers are shown to three significant figures.

<sup>1</sup> Total length of main at year end is used as the denominator in these calculations.

<sup>2</sup> Portsmouth Water's 1997-98 leakage appears to have risen. This is because of data improvements and causes a data discontinuity for prior years.

<sup>3</sup> The entries for Three Valleys Water include the combined figures for Three Valleys Water and North Surrey Water.



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## Approach to target setting

We believe that leakage targets should be based on sound economic analysis. This should include considering the efficient way to balance the supply and demand for water. In this way the costs of reducing leakage will be on a par with the value of water saved.

Since 1997 we have asked companies to submit regular updates on their analyses of economic levels of leakage (ELL) and to propose future leakage targets that were consistent with achieving an ELL by 2002-03. (Pages 14 and 15 provide more details about what is meant by ELL and the work done by the companies to date).

Where we judged these analyses to be robust, targets for 2001-02 were set at the levels proposed by companies. Targets for 17 companies were set in this way. For the remaining companies targets were set pragmatically, taking into account each company's comparative leakage level and comparative resource position. We suggested to these companies how their analyses might be improved. Companies with the highest leakage levels and the tightest balance between available supply and demand are expected to make the biggest reductions.

Companies have now proposed leakage targets for 2002-03. We have shared our views on these with the Environment Agency (EA), the Department for Environment, Food & Rural Affairs (DEFRA), and the National Assembly for Wales (NAfW). The Reporters have also contributed to the target setting process through their independent audit of companies' economic analyses.

## Leakage targets for 2002-03

We have set leakage targets annually since 1997. Last year we decided that the progress on the economics of leakage meant we could step back from 'mandatory' targets. For the first time companies with robust economic levels of leakage set their own targets. We are pleased to be able to do the same again for the year 2002-03.

The success of this approach means that all but three companies will be setting their own leakage targets for 2002-03. These are shown in Table 3 and figures 2a and 2b. Achieving these targets will cause leakage to fall by a further 1.5%.

The approach to obtaining reductions in leakage by Thames Water is discussed on page 12.

Where a company does not meet its leakage target, the following year's target will become 'mandatory'. So for 2001-02, Severn Trent Water, Folkestone & Dover Water, and Tendring Hundred Water now have mandatory targets. If these are achieved then their targets for 2002-03 will be company targets that are based on robust analyses.

Companies demonstrate that their analyses of the ELL are robust by providing Ofwat with an updated submission every other year. This allows them to show that they understand the dynamic nature of ELL and enables them to take account of new technology, improving data quality and changes in supply/demand margins. Part of this process is the calculation of the Long Run Marginal Cost (LRMC) of alternative solutions. It is likely that we will allow companies to use the ELL submissions to demonstrate the robustness and coherence of the LRMC analysis.

Table 3: Leakage targets (Total leakage MI/d)

	2000-01 target	2000-01 actual	2001-02 target	2002-03 target	2002-03 target type
<b>Water &amp; sewerage companies</b>					
Anglian	195	194	192	192	☆
Dŵr Cymru	269	260	254	235	☆
United Utilities	465	463	455	450	☆
Northumbrian	165	164	165	163	☆
Severn Trent <sup>1,3</sup>	333	340	340	340	☆
South West	84.0	83.6	84.0	84.0	☆
Southern	92.0	91.7	92.0	92.0	☆
Thames <sup>2</sup>	582	688	-	-	-
Wessex	85.0	84.2	80.0	75.0	☆
Yorkshire	308	304	301	300	☆
<b>Water only companies</b>					
Bournemouth & W. Hampshire	23.0	22.5	22.4	22.2	☆
Bristol	54.8	54.6	54.8	53.6	☆
Cambridge	14.0	13.3	14.0	14.0	☆
Dee Valley	11.6	11.6	11.5	11.5	▼
Essex & Suffolk	72.8	72.4	71.8	70.8	☆
Folkestone & Dover <sup>1,3</sup>	8.40	8.60	8.50	8.50	☆
Mid Kent	28.9	28.9	28.8	28.8	☆
Portsmouth	30.0	30.0	30.0	29.7	☆
South East <sup>1</sup>	79.1	85.4	75.1	72.2	☆
South Staffs	72.8	72.2	71.8	71.5	▼
Sutton & East Surrey	24.5	24.4	24.5	24.5	☆
Tendring Hundred <sup>1</sup>	5.40	5.45	5.20	5.20	☆
Three Valleys <sup>4</sup>	142	140	141	140	☆

☆ Company target

▼ Ofwat mandatory target

Note:

All numbers are shown to three significant figures.

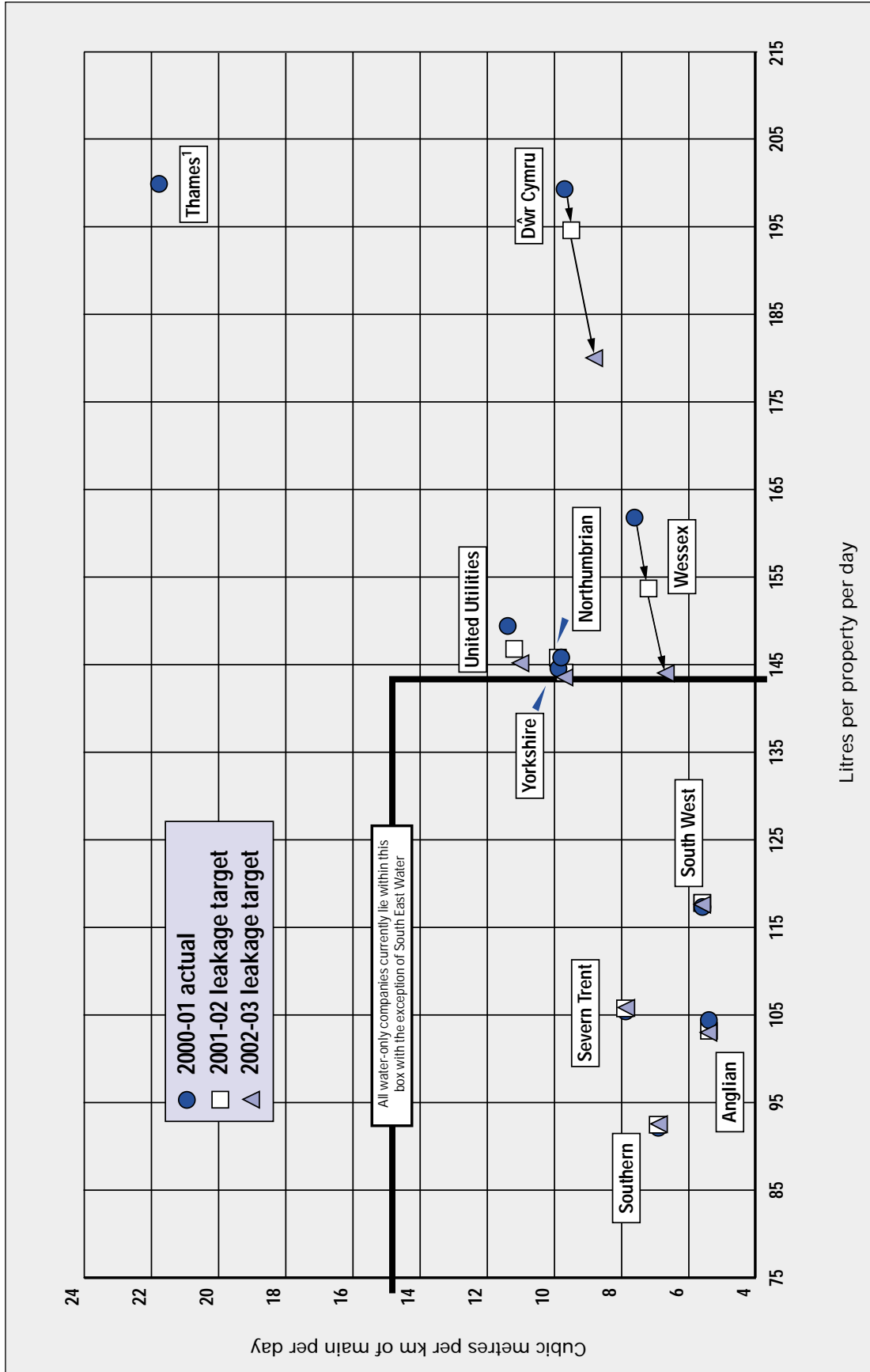
<sup>1</sup> These companies have robust ELL appraisals but failed their 2000-01 targets as discussed on page 3. Their 2001-02 targets will therefore be monitored on a mandatory basis. Achieving the 2001-02 target means the 2002-03 target will be a company target.

<sup>2</sup> Thames Water has not been set a target on the same basis as the rest of the water industry. The reasons for this are discussed on page 12 and the actions Thames Water will be taking are listed at appendix 4.

<sup>3</sup> The 2001-02 targets for Severn Trent Water and Folkestone & Dover Water have been changed from those shown in 'Leakage and efficient use of water 1999-2000 report' following the submission of robust ELL appraisals.

<sup>4</sup> The entries for Three Valleys Water include the combined figures for Three Valleys Water and North Surrey Water. They will be monitored against a single combined target.

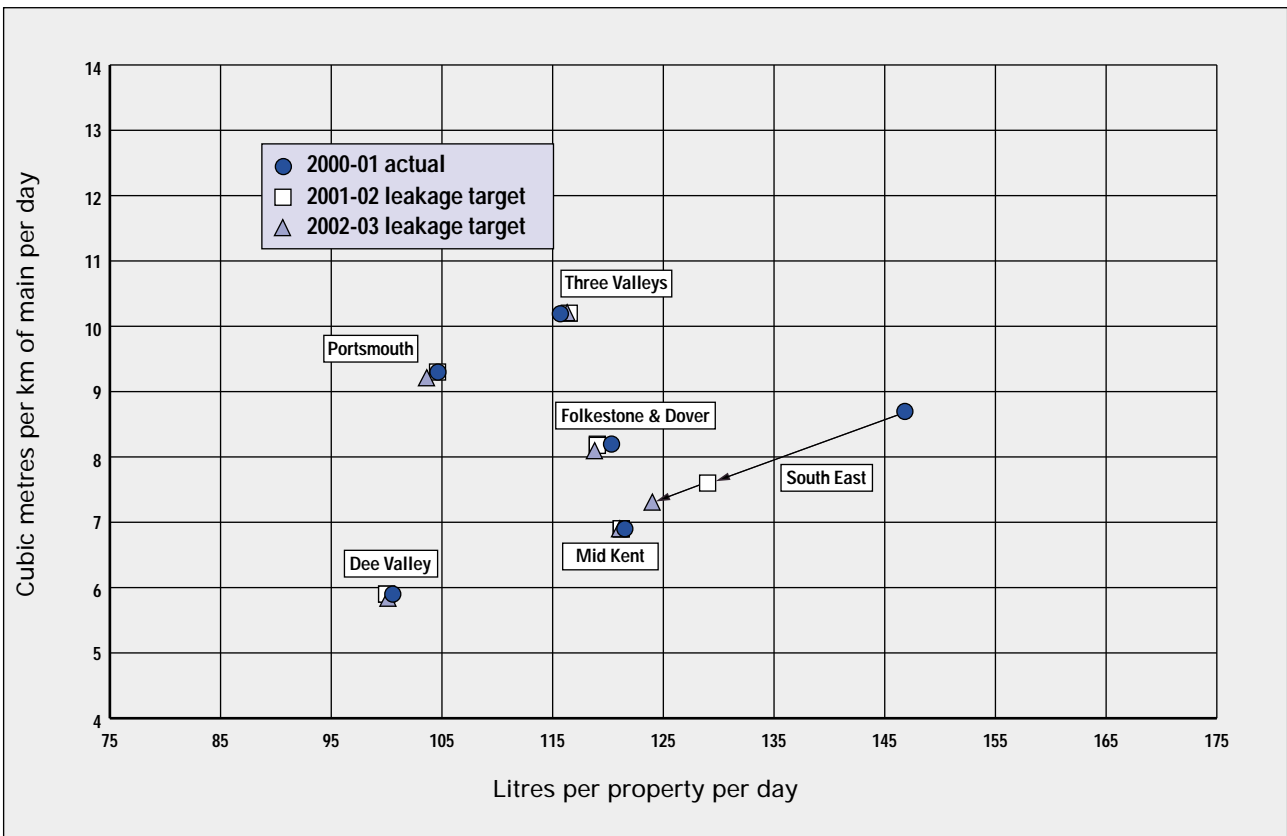
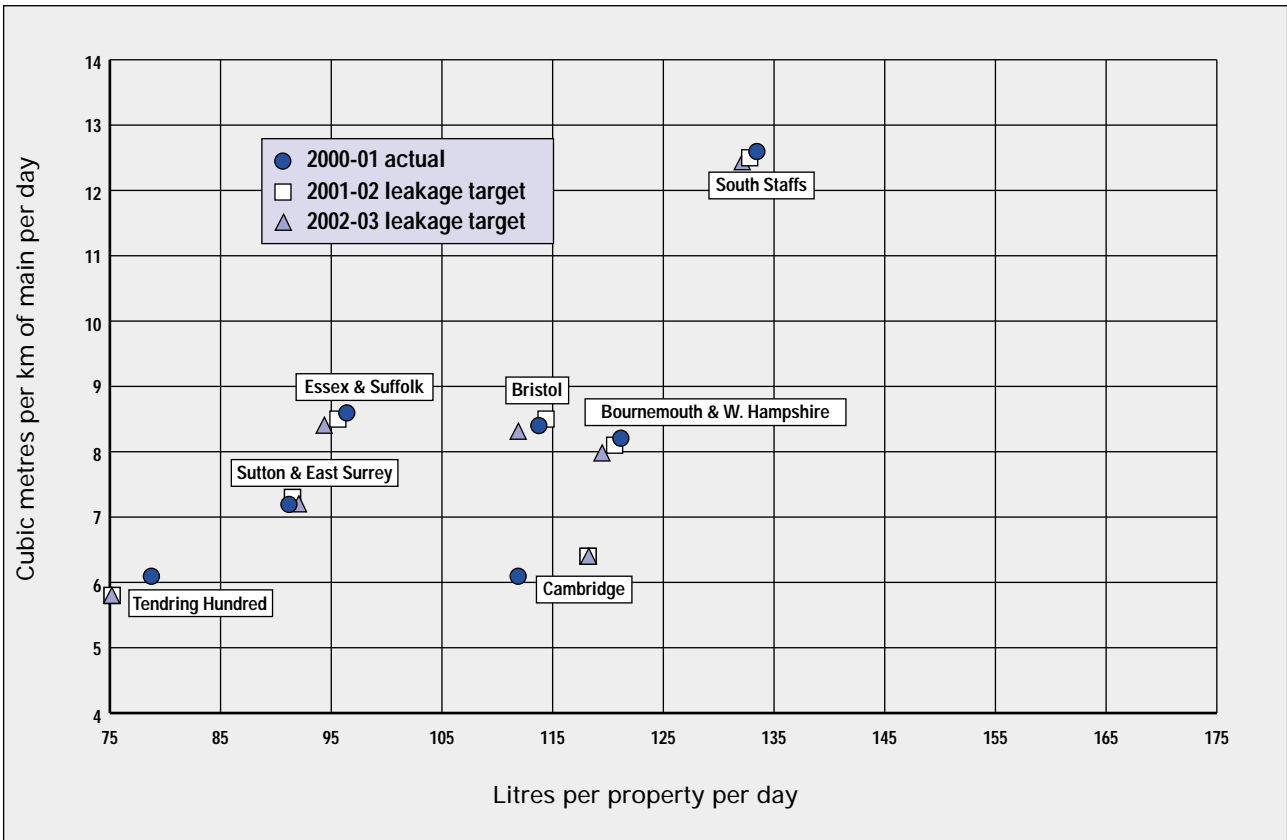
Figure 2a: Water and sewerage companies – leakage 2000-01 to 2002-03



<sup>1</sup>Thames Water has not been set a target on the same basis as the rest of the water industry. The reasons for this are discussed on page 12 and the actions Thames Water will be taking are listed at appendix 4.

Note: Denominators used are 2000-01 total connected properties and 2000-01 year end mains length.

Figure 2b: Water only companies – leakage 2000-01 to 2002-03



Note: Denominators used are 2000-01 total connected properties and 2000-01 year end mains length.

## 2. LEAKAGE AT THAMES WATER

We have been concerned about the level of leakage at Thames Water for many years – we have required quarterly reporting since 1997 and there have been a number of studies into the way the company is managing leakage. Our concerns are not only that Thames Water has the highest leakage level of any England and Wales company (see figure 2a), but that this high level of leakage now seems to be rising. Its water balance for 2000-01 includes 191 MI/d of water (7.2% of the water put into supply) which cannot be explained even after allowing for the company's estimate of leakage. The company's need to enhance security of supply in its London zones reinforces our concerns.

### Identifying the problem

Until 2000 it appeared that Thames Water was reducing leakage in line with our targets. But in the spring of 2000 distribution input – the measure of the water being produced at treatment works and put into the distribution system – began to rise. This was against the trend for the industry and did not seem to be due only to an increase in the demand for water by customers. At the same time Thames Water said that it did not believe it was necessary to make any reductions in leakage even though we had set lower leakage targets.

The quarterly reports submitted through 2000 continued to show that the amount of water put into supply was rising more quickly than demonstrable increases in customer demand for water. We raised our concerns about this in the autumn of 2000. We told the company that we believed it should take immediate action to explain the rise in distribution input and, if due to leakage, to reverse the trend. The company told us that it now recognised the problem and shared our concerns. It would carry out an investigation. We agreed to this.

The investigation, which included the appointment of expert consultants began in February 2001 and continued until July 2001. It confirmed our view that Thames Water was not managing leakage as effectively as most other companies. The company was taking remedial action but this would take time to bear fruit. The key is the progress the company is making in introducing district metering – a management tool that allows leaks to be identified and located more quickly and gives an improved understanding of the costs and benefits of leakage control activity. To date progress has been comparatively slow

due in part to complex systems in London. This shortcoming has a further impact on the company's ability to produce a robust assessment of the economic level of leakage.

The investigation produced some evidence to suggest that there were reasons (related to the interaction between the soil type and pipe age and material) for London leakage to be somewhat higher than elsewhere.

The annual return for 2000-01 confirmed that leakage and distribution input had risen. The unexplained element of distribution input was continuing to increase (4.5% in 1999-2000, now 7.2%). The way this component has increased over two years seems to rule out increasing demand alone as the cause of rising distribution input. Accordingly, it is probable that much of the increase is due to rising leakage. In addition, the higher levels of distribution input mean that very little progress has been made in meeting the requirement to restore security of supply in London.

The figures submitted by Thames Water for 2000-01 showed that leakage had risen from 661 MI/d last year to 687 MI/d this year. But this was after making adjustments to absorb the 7.2% (191 MI/d) of measured distribution input that remained after measured distribution input was compared to the sum of the other measured and estimated components of the water balance, including nightflow method estimate of leakage (see appendix 1). We think that it is only appropriate to redistribute remainders across all the water balance components where they are 5% or less. This is because bigger differences suggest major problems with the water balance in the estimates of its components (Demand Forecasting Methodology, UKWIR, 1995). And the average remainder for the rest of the industry is less than 1% and is decreasing annually. So where the total remainder is more than 5% then total leakage should be calculated solely as the remainder of measured distribution input after all other components are deducted. If Thames Water had done this it would have reported leakage to be 832 MI/d for 2000-01.

Figure 3 shows how Thames Water's estimate of leakage - which we think is an underestimate - is now little better than it was in 1992-93. Yet the rest of the industry has made significant improvements and is now operating at very close to an economic level of leakage.

### Agreed steps

Thames Water has undertaken to restore security of supply in all its zones by 2003-04 and plans to develop new resources in response to rising distribution input. But as higher leakage may account for much of the rise in distribution input we are not convinced that its strategy is based on the most appropriate mix of leakage reduction and resource development.

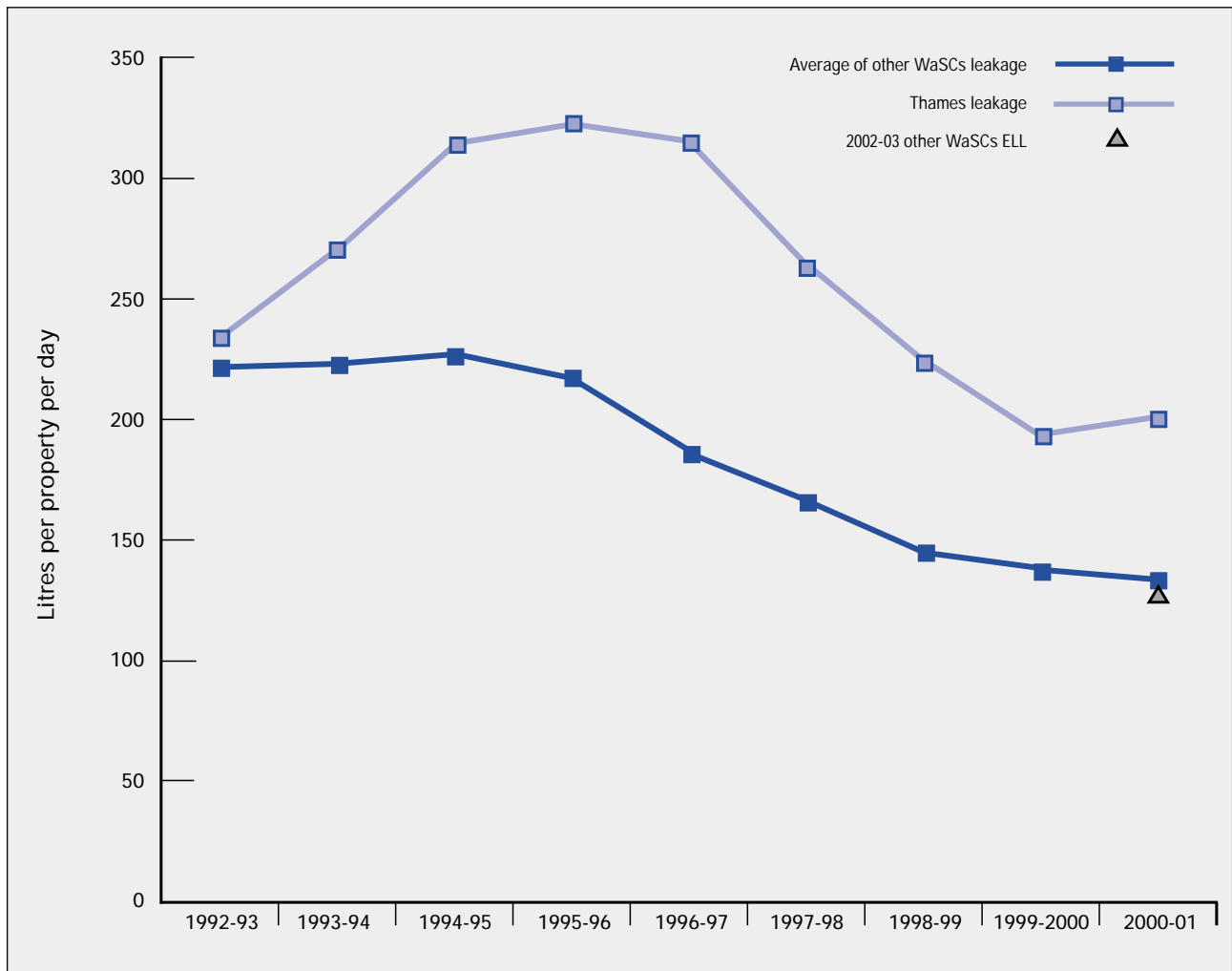
Thames Water is required to take corrective action. It will make all necessary improvements to be in place for the year 2003-04. We will monitor progress towards them with the help of the Environment Agency and the Reporter. If at any time it does not make progress in line with milestones then we do have enforcement powers under the Water Industry Act 1991 to take action and shall do so. Thames Water is now working with us, the EA, and the Reporter on the detail of the agreed steps.

The objectives of the work programme for Thames Water are to:

- Develop a robust assessment of the economic level of leakage and to achieve leakage at the economic level for report year 2003-04.
- Establish a robust water balance for the company.
- Produce and implement an acceptable resource plan to achieve target headroom by 2003-04 and maintain it thereafter.

The 'agreed steps' are set down at Appendix 4 to this report.

Figure 3: Leakage trends for Thames Water and the industry



### 3. DEVELOPMENTS IN LEAKAGE

#### National Audit Office Report to Public Accounts Committee

In November 2000 the National Audit Office (NAO) published the results of its examination of how we regulate the water companies in managing leakage and promoting the efficient use of water. In February this year the Public Accounts Committee (PAC) took evidence on the NAO's report and will at some time in the future publish its conclusions.

The NAO looked at leakage and water efficiency because:

- Reducing leakage and promoting water efficiency was an important part of the Government's objectives for the water industry. In 1998 the PAC said that they expected Ofwat to monitor closely companies' progress on leakage targets, and to act promptly if a company failed its target.
- In some parts of the country water resources were limited and demand was expected to increase. Companies serving such areas should avoid excessive leakage and promote efficient water use.

The NAO was able to conclude that we had sought to reduce leakage and that the companies had responded positively. The NAO said that reductions in leakage had produced benefits – but the costs incurred were not clear. Finally they said that it was difficult to decide how much further leakage should be reduced but we should do more work to resolve this issue.

The NAO made six recommendations to Ofwat, four on leakage and two on the efficient use of water. On leakage we should:

- Encourage companies to improve the quality of estimates of unmetered domestic consumption. (Recommendation 1).
- Consider how the importance of securing supply to customers can best be taken into account when regulating leakage. (Recommendation 2).
- Reflect the potential benefit to the environment of reducing leakage. (Recommendation 3).
- Establish the financial costs and benefits of leakage control and the scope for reducing costs through technological advances. (Recommendation 4).

In response to these we have:

- Carried out with the companies and the Reporters a review of the companies' unmeasured per capita consumption monitors. (Recommendation 1, see page 16 for more details).
- The tripartite study will report on best practice in calculating economic levels of leakage including consideration of supply and demand issues, likely efficiency in terms of new technology and environmental costs and benefits. (Recommendations 2, 3 and 4).

Recommendations on the efficient use of water are discussed on page 26.

#### Economic levels of leakage

The water companies in England and Wales manage water distribution networks with a total length of more than 300,000 km. There are more than 23 million connections to properties, which also have the capacity to leak. Reducing leakage to zero would be virtually impossible and enormously expensive.

So companies must strike a balance between the cost of reducing leakage and the value of the water saved. The level of leakage at which it would cost more to make further reductions than to produce the water from another source, is known as the economic level of leakage (ELL). Operating at ELL means that the total cost to the customer of supplying water is minimised and companies are operating efficiently. By setting leakage targets at an economic level, or a proxy for the economic level where this has not been adequately assessed, leakage targets help to ensure best value for customers.

On this basis leakage reduction should be planned to minimise the total costs of a long-term plan to balance supply and demand. The precise profile of leakage reductions over time depends on the costs of meeting or managing demand by alternative means, including an assessment of the environmental benefits and disadvantages.

ELL is dynamic and depends on a wide range of factors. These will vary both between companies and over time. For example, the cost of detecting and repairing leaks will fall as new technology is introduced. This will cause the ELL to fall. Conversely, if total demand falls to a point where there is a large surplus of water, it



may not be economic to reduce leakage, unless this water can be sold to other companies.

Ofwat expects companies to demonstrate that they have a good grasp of ELL in each of their water supply zones and are aware of changes over time through regular updates of their analyses. Likewise, the relationships between leakage levels and expenditure on leakage control should be based on company-specific experience rather than national assumptions.

### Companies' work to date

In 1997 Yorkshire Water was the first company to provide Ofwat with an assessment of its ELL. Since then companies have submitted updated appraisals twice as part of the periodic review process, and then either as part of the June Return for 2000 or as part of the June Return for 2001. On all occasions these appraisals were assessed according to:

- The **methodology** used to derive the potential costs and benefits of leakage control policies.
- The **quality of the data** used within the model, and whether this is based on company-specific studies, is verifiable and representative.
- The **breadth of analysis** - whether a sufficient range of policy options have been examined.
- The **robustness of the water balance**, and in particular estimates of unmeasured consumption.
- The **consistency of approach** and whether or not the various options to balance supply and demand have been assessed in a consistent fashion.

We also make comparisons between companies, particularly those in the same region, on both their assumptions and results. Where companies satisfied these criteria, leakage targets were set on the basis of companies' proposals. Where the appraisals do not meet Ofwat requirements, targets are set pragmatically.

Companies that we considered to have robust appraisals last year were not required to update their analyses in this year's June Return. However, our general experience is that when a

company reviews its appraisal lower ELLs result as the effects of new technology and better management are felt. We expect this trend to continue and now require ELL appraisals to be re-submitted at least every other year.

### The future

During the last 12 months WRc has led a multi-disciplinary team in a study of leakage target setting and the scope for further reductions. This has been done on behalf of the tripartite group of Ofwat, the EA, and DEFRA.

The overriding objective of the study is to consider how companies should undertake a fully integrated appraisal of the financial, social and environmental aspects of their leakage reduction and other operations to ensure the efficient use of water resources now and in the future by all abstractors.

The project does not seek to replicate the considerable work and systematic studies previously undertaken. Rather, it seeks to bring further insights in the light of experience, improved data, more powerful analytical techniques and the ability to do more sensitivity analyses.

In recognition of the implications this report will have on the industry the tripartite group has involved industry practitioners and representatives from the Water UK leakage group at several key stages throughout the study. Their feedback has been an important part in the process of producing the report.

The final report will be published later this year.

### Household consumption and the water balance

81% of domestic customers in England and Wales do not have a meter to record the amount of water they use. Other components of the water put into the distribution system are also unmeasured, including leakage, water taken illegally, operational use by the companies, unmeasured non-household use and water taken legally but not billed for.

This means that these components have to be estimated and added to measured components for reconciliation with distribution input, (which is measured). The result is known as the 'water balance'. If any of the estimated components of the water balance are overstated then other



components will be understated. So, if the estimate of unmeasured household demand was too high it could mean that a false figure for leakage was reported.

With this in mind and the recommendations arising from the NAO investigation (see page 14) Ofwat has completed a review of unmeasured per capita consumption. This is discussed in the next section on this page.

Figure 4 shows the proportion of distribution input accounted for by each of the components in England and Wales this year. Table 4 shows the movements in these components since 1995-96.

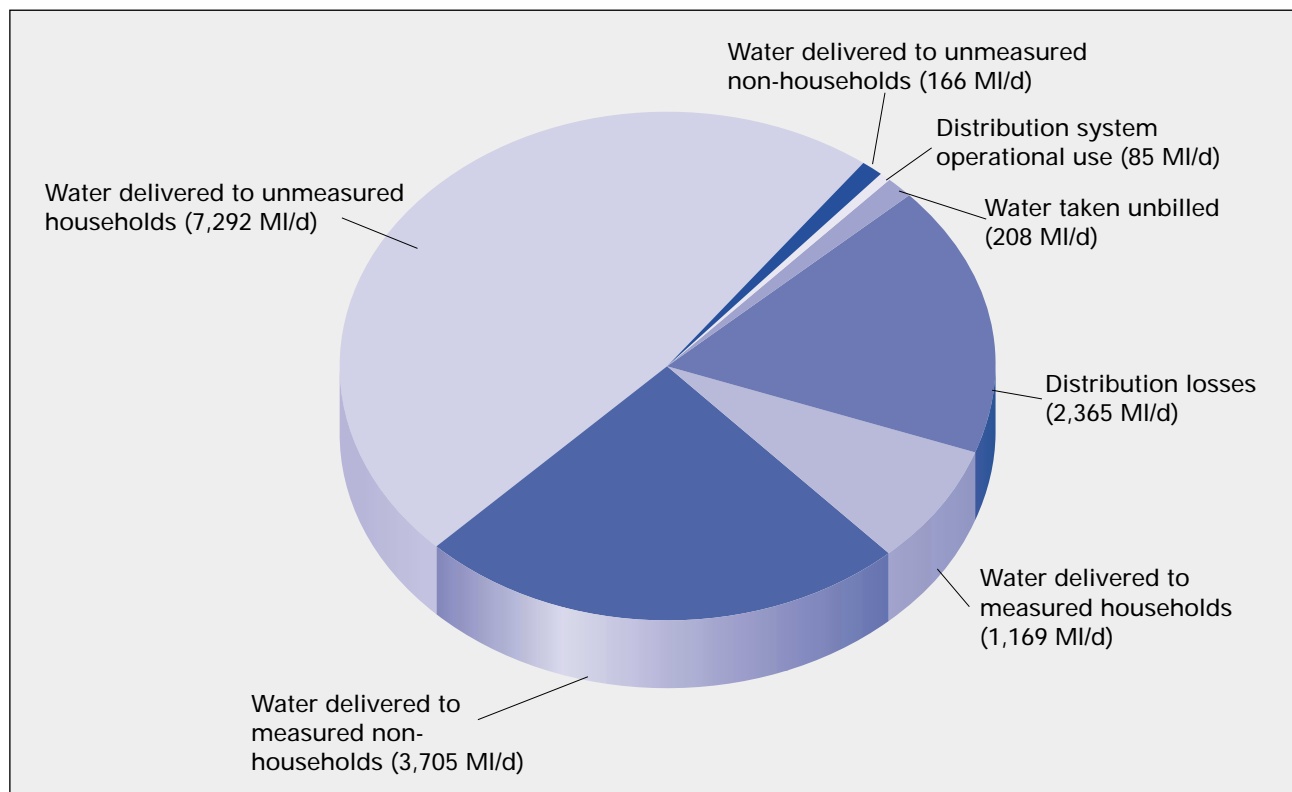
### Unmeasured household consumption

Because only 19% of households in England and Wales have meters, the demand for water from the remaining households must be estimated. This is done mainly through the use of unmeasured per capita consumption (upcc) monitors. These monitors can be split into two main types, area monitors and individual household monitors.

Area monitors measure water flowing into a distinct area and after reductions for measured consumption, non-household use and leakage this can be ultimately divided by the population to arrive at a per capita figure. Individual household monitors meter each customer in the sample directly but they are still charged on an unmetered basis. Again dividing by occupancy / population means a per capita figure is derived. The results of these monitors are then extrapolated across the companies using factors such as household type, occupancy, rateable value, socio-economic indicators etc. There is roughly a 50:50 split between companies operating each kind of monitor.

In February 2001, with the assistance of the companies and the Reporters, we undertook a review of the upcc monitors used by the companies and the compliance with best practice as detailed in the UK Water Industry Research Limited (UKWIR) report 'Best practice for unmeasured per capita consumption monitors'.

Figure 4: Components of water supply



We found that most companies have adopted or were already applying best practice to their consumption monitors in terms of: sample selection and extrapolation, meter selection and maintenance, data recording and validation, leakage calculations, and dealing with data gaps. However, the Reporters played an important role in identifying scope for improvement or areas where problems may develop in the future.

Customers switching to metered supplies increase the accuracy of the volume supplied to them. But switching may statistically weaken the sample used for unmetered customers. Most recommendations of the review pointed to the need for the identification of discrete locations of largely unmetered domestic properties for area monitors. For individual household monitors the Reporters recommended that companies recruit new members on an annual basis to maintain a valid and representative sample in the face of increased switching.

Other recommendations included regular programmes of meter maintenance, regular monitoring of household data particularly occupancy rates and, increasing the sample of certain household types that are underrepresented in the sample as a whole.

The UKWIR best practice report recommends that area and individual monitors be run in parallel to give the maximum confidence to the results produced. The report does note that this should not be a universal requirement because of the cost involved. Most companies and Reporters agreed that for the extra confidence gained the costs involved would not be worthwhile.

In 2000-01 unmeasured per capita consumption at an industry level has remained relatively stable increasing by less than half of one per cent. Table 6 shows companies' estimates of unmeasured per capita consumption. Ofwat will continue to monitor closely companies' estimates of this important water balance component.

Table 4: Major components of distribution input in England and Wales (MI/d)

	1995-96	1996-97	1997-98	1998-99	1999-2000	2000-01
<b>Water delivered to:</b>						
Measured households	436	530	686	860	1,046	1,169
Measured non-households	3,948	3,900	3,804	3,718	3,757	3,705
Unmeasured households	8,379	8,072	7,778	7,421	7,385	7,292
Unmeasured non-households	370	330	243	208	181	166
Water taken unbilled	153	169	150	156	171	208
<b>Total water delivered</b>	<b>13,286</b>	<b>13,002</b>	<b>12,661</b>	<b>12,364</b>	<b>12,541</b>	<b>12,541</b>
Of which estimated supply pipe leakage	1,295	1,233	1,034	933	875	878
Of which estimated meter under registration	188	185	172	163	181	197
Distribution operational use	56	68	67	73	86	85
Distribution losses	3,685	3,295	2,955	2,618	2,431	2,365
<b>Distribution input</b>	<b>17,027</b>	<b>16,365</b>	<b>15,683</b>	<b>15,056</b>	<b>15,058</b>	<b>14,991</b>
Of which total leakage	4,980	4,528	3,989	3,551	3,306	3,243

Note:

Numbers may not add due to rounding.

## Measured household consumption

Table 7 shows the companies' estimates of measured per capita consumption. There has been a slight decrease of around 2% in the industry average value.

At the industry level this has remained at similar levels to 1995-96, but for many companies there are large movements between years. There are also wide variations between companies. These differences reflect the type of customers opting for a meter, whether the majority are selectively metered or have opted, and the extent to which metering changes customers' habits.

The biggest decrease this year is that of Anglian Water. This follows the recalculation of occupancy rates of measured and unmeasured households. The company's Reporter supports these changes and the occupancy rates can now be seen to be in line with industry averages (see table 11b on page 35 for details). Cambridge Water has shown the largest increase since 1999-2000 probably explained by high meter penetration gradually engulfing consumers of larger water volumes. Portsmouth Water has the highest measured per capita consumption that the company attributes to the high initial uptake of optional meters by sprinkler users.

The proportion of billed households which now have a meter has increased from 17% to 19% in 2000-01, with the greatest proportion of metered customers in the Cambridge Water area (45% of billed households). As a result of

this increase, water delivered to measured households has risen by 123 MI/d, a smaller increase than that reported last year.

Companies expect the proportion of measured households to continue to increase as a result of the Water Industry Act 1999 (WIA). This gave customers the right to have a meter fitted free of charge where the installation is practical and not unreasonably expensive, from 1 April 2000. Table 5 shows the increase in household meter penetration 1996-97 to 2000-01. Appendix 2 shows the number of selective and optional meters brought into charge in 2000-01 by each company.

Metering and sensible tariff structures can play an important role as part of a demand management strategy, particularly in relation to customers who use a large amount of water for non-domestic purposes such as filling swimming pools or for garden sprinklers. We believe that it is right that the prices these customers pay should reflect the demands that their use places on the system.

## Average household consumption

Table 8 shows average household consumption of metered and unmetered households. Household demand has remained fairly constant when it might be expected to fall due to more switching to measured supplies. The increasing number of single occupancy households which generally show higher per capita demand and increased appliance ownership may account for the trend.

Table 5: Household metering<sup>1</sup>

	1996-97	1997-98	1998-99	1999-2000	2000-01
Optional meters <sup>2</sup>	224,542	392,506	333,642	271,602	232,522
Selective meters <sup>3</sup>	53,641	166,650	152,401	81,395	11,674
% of billed households metered <sup>4</sup>	8	11	14	17	19

<sup>1</sup> Meters which were first used for charging in each year.

<sup>2</sup> Optional meters are installed at the customer's request. All household customers are entitled to a meter free of charge.

<sup>3</sup> Selective meters are installed at the water company's initiative. Companies can only install selective meters in households that have high water use appliances or on change of occupancy.

<sup>4</sup> The rising proportion of households metered also reflects the metering of newly connected household properties.

Table 6: Company estimates of unmeasured household consumption (l/head/d)<sup>1</sup>

	1995-96	1996-97	1997-98	1998-99	1999-2000	2000-01
<b>Water &amp; sewerage companies</b>						
Anglian	155	152	153	149	150	155
Dŵr Cymru	150	146	146	144	144	147
United Utilities	144	138	141	138	138	141
Northumbrian	149	144	144	147	148	148
Severn Trent	140	137	137	138	140	140
South West	163	153	155	156	161	157
Southern	164	160	161	158	160	158
Thames	159	159	161	156	166	167
Wessex	150	145	141	138	139	143
Yorkshire	137	132	137	135	139	140
WaSC average	149	145	147	145	148	149
<b>Water only companies</b>						
Bournemouth & W. Hampshire	179	166	162	161	172	166
Bristol	160	157	151	148	152	150
Cambridge	155	149	147	144	143	146
Dee Valley	163	154	150	147	149	149
Essex & Suffolk	173	162	161	166	162	162
Folkestone & Dover	170	159	160	161	161	160
Mid Kent	168	167	165	167	171	167
Portsmouth	170	162	153	153	163	157
South East	183	167	164	162	162	161
South Staffs	147	147	147	142	142	143
Sutton & East Surrey	186	171	166	162	166	165
Tendring Hundred	150	148	143	125	131	132
Three Valleys <sup>2</sup>	178	170	168	167	170	175
WoC average	171	163	160	159	161	161
Industry average	154	149	150	148	151	152

Note:

All numbers are shown to three significant figures.

Averages are weighted by population of unmeasured households.

<sup>1</sup> Excludes underground supply pipe leakage.

<sup>2</sup> The entries for Three Valleys Water include the combined figures for Three Valleys Water and North Surrey Water.

Table 7: Company estimates of measured household consumption (l/head/d)<sup>1</sup>

	1995-96	1996-97	1997-98	1998-99	1999-2000	2000-01
<b>Water &amp; sewerage companies</b>						
Anglian	129	141	141	134	133	114
Dŵr Cymru	127	136	132	132	127	138
United Utilities	116	109	134	132	131	135
Northumbrian	130	122	119	132	138	130
Severn Trent	133	130	130	131	132	131
South West	136	138	123	129	122	128
Southern	134	130	138	138	139	142
Thames	148	151	155	154	156	154
Wessex	120	124	124	124	129	130
Yorkshire	124	118	125	121	128	131
WaSC average	130	131	136	135	136	132
<b>Water only companies</b>						
Bournemouth & W. Hampshire	160	144	134	134	143	136
Bristol	148	142	135	125	127	128
Cambridge	130	141	131	121	118	129
Dee Valley	123	126	112	122	117	116
Essex & Suffolk	140	140	136	133	128	136
Folkestone & Dover	145	143	146	150	151	147
Mid Kent	149	159	159	153	150	141
Portsmouth	177	109	148	156	187	167
South East	167	159	147	144	153	153
South Staffs	125	131	127	134	135	137
Sutton & East Surrey	120	137	138	152	144	142
Tendring Hundred	133	128	116	114	112	110
Three Valleys <sup>2</sup>	154	150	156	148	157	162
WoC average	148	146	142	139	141	143
Industry average	134	134	137	136	137	134

Note:

All numbers are shown to three significant figures.

Averages are weighted by population of measured households.

<sup>1</sup> Excludes underground supply pipe leakage.

<sup>2</sup> The entries for Three Valleys Water include the combined figures for Three Valleys Water and North Surrey Water.

Table 8: Average estimates of total household consumption (l/head/d)<sup>1</sup>

	1995-96	1996-97	1997-98	1998-99	1999-2000	2000-01
<b>Water &amp; sewerage companies</b>						
Anglian	152	150	150	145	145	138
Dŵr Cymru	150	146	146	143	143	146
United Utilities	142	136	141	137	138	140
Northumbrian	148	143	143	146	148	147
Severn Trent	140	136	136	137	139	139
South West	161	152	151	152	153	150
Southern	160	156	158	155	157	155
Thames	158	159	161	155	165	165
Wessex	148	143	139	135	137	140
Yorkshire	137	131	135	133	138	139
WaSC average	148	144	146	143	146	146
<b>Water only companies</b>						
Bournemouth & W. Hampshire	178	164	159	157	168	161
Bristol	160	156	150	146	149	147
Cambridge	152	148	144	138	134	139
Dee Valley	160	151	145	143	144	143
Essex & Suffolk	171	160	159	161	156	157
Folkestone & Dover	167	157	157	159	159	157
Mid Kent	166	166	164	165	168	162
Portsmouth	170	162	153	153	163	157
South East	181	166	162	159	160	160
South Staffs	146	146	146	141	141	143
Sutton & East Surrey	183	170	165	161	163	162
Tendring Hundred	148	146	139	122	126	124
Three Valleys <sup>2</sup>	177	169	167	165	168	174
WoC average	169	162	158	157	158	159
Industry average	152	148	149	146	149	149

Note:

All numbers are shown to three significant figures.

Averages are weighted by population of households.

<sup>1</sup> Excludes underground supply pipe leakage.

<sup>2</sup> The entries for Three Valleys Water include the combined figures for Three Valleys Water and North Surrey Water.

## 4. PROMOTING THE EFFICIENT USE OF WATER

### Companies' duty to promote the efficient use of water

Since February 1996, companies have had a duty to promote the efficient use of water by all their customers and we are responsible for enforcing this duty. So while we work with the Department for Environment, Food and Rural Affairs (DEFRA) and others on wider initiatives to make water use more efficient, for example through water regulations or more efficient appliances, we focus mainly on the role of water companies. We approved each company's initial strategy in April 1997. Companies' strategies have since evolved and we monitor each company's progress annually.

We use four criteria in assessing whether companies fulfil this duty:

- Is there an efficient pricing framework, providing measured customers with appropriate incentives to use water wisely?
- Is there a long-term education programme to sustain customer awareness of the need for sensible water use?
- Is the level of company activity on efficient use of water economic? (The economics of efficient use of water activity are explained in greater detail below).
- Is promotion directed to those customers who will benefit most?

We expect a basic, minimum level of activity from all companies. However, where water supplies are under pressure a more active approach is necessary. We consider this when assessing companies' progress.

### Understanding the economics of water efficiency activity

We expect companies to assess the role of water efficiency within a long-term plan to balance supply and demand. If the cost of saving water by promoting and adopting a water efficiency measure is less than the cost of delivering additional water, this suggests that it would be economic for the company to promote water efficiency measures. There is an economic level of water efficiency activity, in the same way as there is an economic level of

leakage, which will vary from company to company. Companies should reflect this in their programmes for balancing supply and demand and their LRMC analyses.

Proper research and monitoring are essential to ensure that the companies' strategies focus on what works best. This means establishing robust estimates of the savings and costs of various initiatives based on actual (measured rather than estimated) changes in consumption. Reliable information on changes in customers' consumption takes time to collect because it is important to assess the long-term costs and sustainability of water savings.

We acknowledge that it is not economic for every water company to undertake detailed trials on all aspects of water efficiency. More co-operation and co-ordination among companies and sharing of research and trial results would allow more cost-effective development of a body of knowledge on what constitutes best practice and what is most economic. UKWIR's<sup>1</sup> project, aimed at identifying best practice in measuring the savings from water efficiency activity, is an important initiative in this regard. Pooling of experience should allow guidance on the most effective approaches to testing or monitoring the impact of different water efficiency measures to be developed.

To encourage improved understanding of the economics of water efficiency activity, we are supporting a new category in the Water UK & Environment Agency's Water Efficiency Awards 2001. The 'Ofwat Economic Research' category is aimed at research projects undertaken by UK water companies and operators, that have significantly contributed to the understanding of the economics of water efficiency initiatives directed at household customers. Criteria for assessing entries includes:

- Does it demonstrate a robust methodology for assessing the economics of water efficiency in the context of balancing supply/demand?
- Are the results in the public domain?
- Has water been saved?

<sup>1</sup>UK Water Industry Research



The category winner will be announced on 12 November 2001. The shortlist for the 'Ofwat Economic Research' category is:

1. Essex and Suffolk Water – 'Sustainable New Homes'.
2. Southern Water – 'Retrofit Dual Flush Study'.
3. Essex and Suffolk Water – 'Cost Effective Household Audits'.

#### Efficient use of water activity 2000-01

Companies reported their activity on efficient use of water activity in the 2000-01 June Return. The key issues to emerge are noted below and in Table 9.

#### Supply pipe leakage – repairs and replacement

Supply pipe repairs are at 91% of 1999-2000 levels. There has been a slight reduction (85% to 82%) in the proportion repaired free of charge. South West Water and Thames Water reported significant reductions in the proportions repaired free.

Supply pipe replacement is at 59% of 1999-2000 levels. There has been a slight increase in the proportion replaced free of charge (49% to 51%). Southern Water and Tendring Hundred Water reported slight reductions.

Figure 5 shows each company's total activity on supply pipe repairs and replacement in 2000-01 as the number carried out per 10,000 properties. The range of activity varies from just over 12 repairs/replacements (Portsmouth Water) per 10,000 properties to 59 per 10,000 properties (Wessex Water and Mid Kent Water).

Appendix 5 summarises each company's policy on supply pipe repairs and replacement for 2000-01.

#### Cistern Devices

Distribution of cistern devices has decreased markedly to 35% of 1999-2000 levels. This may reflect a tailing off of activity as some companies claim to have distributed a cistern device to most or all of their customers already. However, some companies are sceptical about the effectiveness of these devices due to double flushing. We consider that, rather than rejecting the whole concept of cistern devices, companies should ensure that customers are given clear

instructions to remove the device if problems arise. They should also investigate whether using smaller cistern devices eliminates the problem. We expect companies to promote cistern devices. If companies do not promote cistern device installation, we expect them to be able to justify it by reference to their individual circumstances.

#### Household water audits

There has been a large increase in the number of household water audits distributed (241% of 1999-2000 levels). This appears consistent with our view that self-audit is likely to be one of the most cost-effective efficient use of water activities. Northumbrian Water, Severn Trent Water and Thames Water are the exceptions with significant downturns in distribution (28%, 33% and 23% of the activity levels reported in 1999-2000 respectively).

#### Information to customers

All companies provide their customers with literature on the efficient use of water. We accept that the amount of promotional information disseminated may vary from year to year, but as a minimum, household customers should be able to obtain advice on:

- The sensible use of water in the home and garden.
- How to conduct an audit of their own consumption.

And to be aware of

- The availability of cistern devices and other water saving devices.
- The availability of free supply pipe leak detection and repair and a leak-line number.
- How to get further information.

We assess the quality of each company's customer literature for households against these criteria.

We identified, in the 'Leakage and the efficient use of water, 1999-2000 Report', that the information sent by five companies in 1999-2000 required improvement. In the cases of Anglian Water, United Utilities Water, South West Water and Folkestone & Dover Water their unsolicited information (issued to all customers



Table 9: Industry progress in promoting the efficient use of water

	1996-97 <sup>1</sup>	1997-98	1998-99	1999-2000	2000-01	Total
<b>Supply pipe repairs</b>						
Number of supply pipes repaired (nr)	36,500	76,240	77,024	73,586	66,951	330,301
Number of supply pipes repaired free (nr)	19,128	67,199	67,707	62,693	54,602	271,329
Charged for (nr)	17,372	9,041	9,317	10,893	12,349	58,972
<b>Supply pipe replacements</b>						
Number of supply pipes replaced (nr)	1,126	9,366	11,643	12,766	7,556	42,457
Number of supply pipes replaced free (nr)	0	3,248	5,393	6,311	3,871	18,823
Charged for (nr)	1,126	6,118	6,250	6,455	3,685	23,634
<b>Cistern devices</b>						
Number of cistern devices distributed to households (nr)	366,297	2,770,715	1,419,987	1,417,388	497,216	6,471,603
Number of devices installed by household customers (nr)	n/c	n/c	n/c	518,303	137,432	655,735
Number of devices installed in households by company (nr)	n/c	n/c	n/c	4,384	541	4,925
<b>Other devices<sup>2</sup></b>						
Other household water saving devices installed (nr)	16,100	48,287	85,388	104,753	46,293	300,821
<b>Household water audits</b>						
Household self water audit packs distributed by company (nr)	1,000	1,251,860	2,009,486	1,551,809	3,737,285	8,551,440
Household water audits completed by company or agent (nr)	865	12,467	14,120	11,739	28,077	67,268
<b>Non-household water audits</b>						
Household self water audit packs distributed to commercial customers by company (nr)	n/c	n/c	n/c	23,495	12,812	36,307
Water audits at commercial premises completed by company or agent (nr)	1,094	5,479	10,276	8,352	3,075	28,276
Self water audit packs distributed to institutional customers by company (nr)	n/c	n/c	n/c	4,968	3,395	8,363
Water audits packs at institutional premises completed by company or agent (nr)	n/c	n/c	n/c	412	241	653
Byelaw inspections completed by company (nr)	n/c	n/c	n/c	17,671	36,864	54,535
<b>Total savings/costs</b>						
Total savings achieved/assumed <sup>3</sup> (MI/d)	n/c	312	201	157	119	789
Total cost of initiatives (£000)	n/c	106,153	96,757	32,264	26,453	261,628
Unit cost of savings (p/m <sup>3</sup> )	n/c	93	132	56	61	91

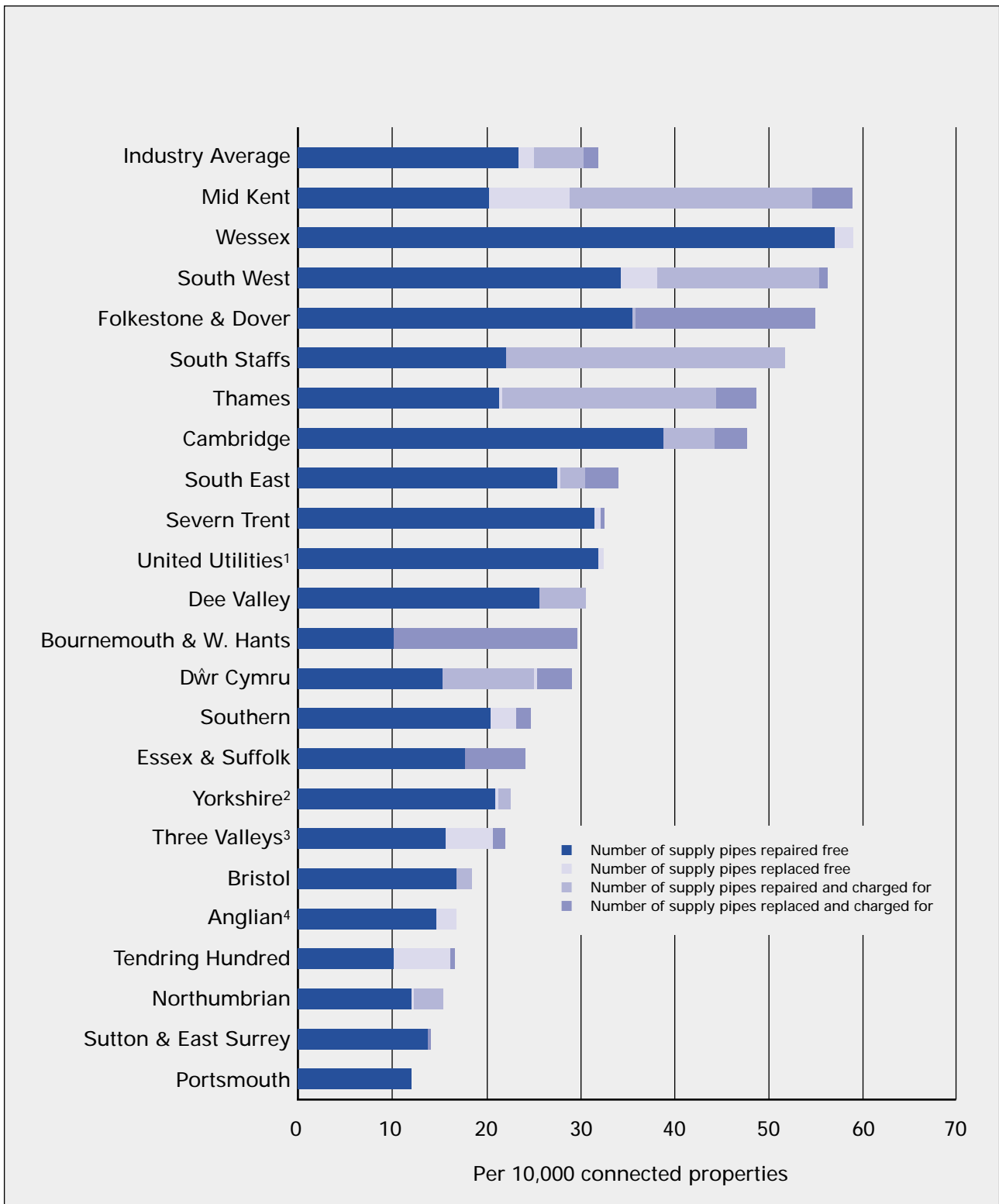
<sup>1</sup> Data is incomplete for 1996-97 as companies reported in the form of a written commentary.

<sup>2</sup> Other water saving devices include the issue of water butts and spray guns.

<sup>3</sup> The assumed/estimated savings from water efficiency activity should be treated with caution. Supply pipe leakage savings (which account for around 90% of 2000-01 total savings) show a significant range at a company level from none to 44 MI/d. The range in companies' estimates is largely attributable to different interpretations of Ofwat's reporting guidance. Therefore a company breakdown has not been included. Ofwat will revise its guidance for the June Return 2002.

n/c = information not collected.

Figure 5: Supply pipe repairs and replacement in 2000-01



Companies are sorted by the total number of repairs/replacements per 10,000 connected properties.

<sup>1</sup> North West Water has changed its name to United Utilities Water.

<sup>2</sup> Yorkshire Water's data includes data for York Waterworks.

<sup>3</sup> Three Valleys Water's data includes data for North Surrey Water.

<sup>4</sup> Anglian Water's data includes data for Hartlepool Water.

automatically) required improvement. We required improvements to Dee Valley Water's information sent on request. We wrote to these companies in March 2001 to clarify the improvements required. We have asked the companies to consider ways in which they can address our concerns for incorporation into 2001-02 information.

However, Dee Valley Water's unsolicited leaflet 'Tips on how to save water' and its billing leaflet for 2001-02, addressed our concerns. We are looking for the other companies to revise their information.

We accept that it would not necessarily be appropriate to send detailed unsolicited information on water efficiency every year. It is however important that over a period of a few years all customers should receive some information on water efficiency and some practical tips on saving water.

#### Companies' efficient use of water plans 2000-05

We required companies to submit, in July 2000, a five-year strategy (2000-05) for water efficiency activity. We gave the Ofwat Customer Service Committees and the Environment Agency the opportunity to comment on key elements of companies' plans. Companies should focus on the initiatives that are likely to be the most cost effective or beneficial to customers in their promotion of efficient use of water initiatives. We asked companies to focus on these areas in their 2000-05 plans. We required the companies to set out their:

- Plans to ensure that all customers have access to cistern water saving devices and advice on how to use them.
- Plans to promote advice on self-audits for schools, hospitals and other community premises.
- Long term educational strategies.
- Longer-term programmes to provide customers with water saving advice, including advice on self-audits of household water consumption over the five years.

<sup>1</sup>RD07/01 Water Efficiency Plans 2000-05 (8 May 2001).

<sup>2</sup>Office of Water Services Leakage and Water Efficiency: Report by the Comptroller and Auditor General 1 December 2000.

We assessed the companies' submissions and presented the conclusions in May 2001<sup>1</sup>. We are satisfied, in the current context, that the plans allow companies to satisfy their duty to promote the efficient use of water. However, we expect companies to take into account improved knowledge and evidence and update their plans accordingly. Changes to the balance between supply and demand will require companies to review the role of water efficiency measures within their overall Water Resource Plans. We expect companies to notify us of any departures from their five year strategies in the annual June Returns to us.

The key elements arising from companies' water efficiency plans 2000-05 and our review are summarised in Table 10.

#### Changes to companies' strategies from their 2000-05 plans.

Our June Return reporting requirements indicate that companies should use their commentaries to the June Return to compare performance against any targets from their Water Efficiency Plans. The commentary also provides opportunity for the companies to bring to our attention any policy changes from those previously adopted. For the most part, the companies' 2000-01 activity on water efficiency is consistent with their 2000-05 strategies.

#### National Audit Office Report to Public Accounts Committee

The National Audit Office (NAO) reported in December 2000<sup>2</sup> on water companies' progress in promoting the efficient use of water (the NAO's findings on leakage are referred to on page 14). The NAO found that under our framework companies have made significant progress in promoting the efficient use of water, through activities such as metering, repairing supply pipes, distributing cistern devices and water audits, and in educating customers.

A survey by the NAO showed that 57% of customers recalled having seen advice on using water efficiently and 88% claimed to be carrying out some water-saving activity.

Table 10: A summary of RD07/01: Efficient use of water – current progress and future plans

Efficient use of water activity/initiative	Ofwat position	Companies' actions/plans
Cistern devices	<ol style="list-style-type: none"> <li>1. We expect companies to ensure that all customers have access to cistern devices free of charge on request.</li> <li>2. Billing literature should advise customers of cistern device availability.</li> <li>3. Companies' plans for distribution and promotion of cistern devices should relate to resource situation and past levels of activity.</li> <li>4. Companies should ensure that customers are given clear instructions to remove the device if problems arise and investigate whether using smaller devices eliminates any problems.</li> <li>5. Companies should consider whether they are making the best use of existing customer contacts.</li> <li>6. Distributing cistern devices and self audit packs, as a combined "water efficiency pack", is likely to be a cost-effective approach.</li> </ol>	<ol style="list-style-type: none"> <li>1. All companies' plans meet the basic requirements of 1 and 2.</li> <li>2. Cistern device promotion is linked to activity on self-audit promotion.</li> <li>3. Several companies have distributed cistern devices to most or all of the households in their region or plan to do so by the end of the period.</li> <li>4. Many companies propose to target distribution of cistern devices in specific areas where demand management measures would be most beneficial.</li> </ol>
Self-audits	<ol style="list-style-type: none"> <li>1. There is evidence that self-audits are likely to be cost-effective.</li> <li>2. All customers should have access to information explaining how to audit their water consumption and how to reduce the amount of water they use.</li> <li>3. Companies should ensure that unmeasured customers are aware of self-audit leaflet availability.</li> </ol>	<ol style="list-style-type: none"> <li>1. Several companies have already taken the opportunity to send a self-audit leaflet to all domestic customers or plan to do so by the end of the period.</li> <li>2. All companies meet the basic requirement that advice to all customers should be available on request.</li> </ol>
Long term educational programmes	<ol style="list-style-type: none"> <li>1. While the benefits are difficult to quantify, they are an important part of companies' overall strategies.</li> </ol>	<ol style="list-style-type: none"> <li>1. Companies recognise the importance of long term education strategies.</li> <li>2. Water companies provide information through newsletters, and billing literature for example.</li> <li>3. All companies have developed broad-ranging education programmes.</li> </ol>
Information on water savings in schools and institutions	<ol style="list-style-type: none"> <li>1. Water audits for customers such as schools and hospitals, where consumption is traditionally high, can yield significant savings in water and reduce the customer's bill.</li> <li>2. Companies are focusing an acceptable level of information on schools and institutions.</li> </ol>	<ol style="list-style-type: none"> <li>1. Many companies are distributing self-audit packs to schools. Some companies are considering revising their packs so they can be distributed to other community buildings/hospitals.</li> <li>2. Some companies are working with local authorities or other bodies eg in promoting energy efficiency.</li> </ol>
Information for business customers	<ol style="list-style-type: none"> <li>1. Customers should have access to information that helps them reduce bills and usage.</li> <li>2. It is not always appropriate to issue the same information each year to every customer.</li> </ol>	<ol style="list-style-type: none"> <li>1. All companies provide literature including advice on how to assess and reduce consumption.</li> </ol>

In evidence to the NAO we explained our view that the regulator should proceed cautiously in setting out what companies should do to meet their statutory obligations. There is currently limited information on the cost-effectiveness of specific water efficiency measures, particularly over the longer term. Furthermore, most companies currently have adequate resources to meet existing demands for water with few proposals for the development of new resources. In these circumstances we consider that companies should continue to promote awareness of the need to avoid wasting water and to focus on initiatives which are most likely to be cost effective or beneficial to customers.

The NAO accepted that this approach was reasonable but noted the need to continue developing more robust information on costs and benefits.

In particular the NAO recommended that we:

1. Obtain a better picture of the effectiveness of different types of action to promote water efficiency – particularly in the estimation of savings attributable to efficient use of water activity.

- We are working with the industry to improve the quality of research – specifically through UKWIR's project on 'Quantification of Savings, Costs and Benefits of Water Efficiency and the Effects for Charging'.

The UKWIR project will provide guidance on the best way to assess the costs and water savings of water efficiency activities. This will improve the robustness and comparability of research across the industry.

Phase 1 of the UKWIR project was successfully completed with the launch of best practice guidelines to the industry and others on 25 January 2001. Over the next 18 months a range of demonstration projects will apply the methodology to a range of different water efficiency activities.

The UKWIR water efficiency project is already promoting useful sharing of views on how research should be carried out.

The adoption of best practice guidelines will improve transferability of research results. Demonstration projects should produce good quality data applicable to the wider industry.

- The appropriate level of water efficiency activity must be based on an analysis of the costs and benefits of different approaches to balancing supply and demand. Increased understanding of the effectiveness of activities will help the companies and us to assess this.
2. Promote greater sharing by companies of the results of their monitoring of the effectiveness of action to promote water efficiency. In this regard:
- We publish annually, through this report, an assessment of achievements and highlighting good practice.
  - We meet regularly with Water UK, the Environment Agency and DEFRA to discuss water efficiency issues, including research results, the collation of research projects onto an accessible database and how results can be shared among the industry and disseminated to other interested parties (e.g. house-builders).
  - We support companies doing research in partnership with other organisations or companies.
  - We are supporting the Economic Research Category Award in the Water UK & Environment Agency's Water Efficiency Awards.
  - Ofwat and several companies are sponsoring the Construction Industry Research and Information Association's research project 'Key performance indicators and benchmarking for water use in buildings'.

We will continue working with the industry to improve understanding of the cost effectiveness of activities to promote the efficient use of water by customers.

We define leakage as 'the loss of water from the supply network, which escapes other than through a controlled action'. 'Distribution losses' include all losses of potable water between the treatment works and the highway boundary. 'Supply pipe losses' is leakage from customers' pipes between the highway boundary and the customer's stop tap. The sum of these components is 'total leakage'. It does not include leaks on internal plumbing or losses of untreated water.

Some elements of leakage can be measured accurately. For example service reservoir leakage can sometimes be measured by a reservoir level drop test. It is generally difficult to calculate accurately. As a result a number of techniques have been developed for estimating leakage. The two most common are the Minimum Night Flow and the Total Integrated Flow method.

The minimum night flow measures flows at night into districts of 1,000-3,000 properties. At this time consumption is at a minimum so the principal component of this flow will be leakage. After deducting an allowance for legitimate use, the remainder is classified as leakage.

The integrated flow method estimates all other components of the water balance and assumes that the residual, the difference between distribution input and water used, is leakage. It is important that companies using this technique have in place robust monitors for estimating the other components of the water balance, particularly unmeasured household consumption.

We look to companies to use the integrated flow/water balance method, and asks them to reconcile the results with those attained using minimum night flows. Where companies find a difference between leakage calculated by the minimum night flow method and the integrated flow method of more than around 5%, we think the latter approach to calculating leakage should be used.

## APPENDIX 2: HOUSEHOLD SELECTIVE AND OPTIONAL METERS BROUGHT INTO CHARGE IN 2000-01<sup>1</sup>

	Optional meters		Selective meters	
	nr	% unmeas'd h'holds <sup>2</sup>	nr	% unmeas'd h'holds <sup>2</sup>
<b>Water &amp; sewerage companies</b>				
Anglian	44,754	4.67	893	0.09
Dŵr Cymru	22,121	2.10	0	0.00
United Utilities	20,898	0.85	108	0.00
Northumbrian	4,271	0.44	0	0.00
Severn Trent	17,413	0.73	2	0.00
South West	26,960	5.68	193	0.04
Southern	8,641	1.17	573	0.08
Thames	6,570	0.25	384	0.01
Wessex	5,892	1.70	0	0.00
Yorkshire	21,788	1.45	814	0.05
WaSC total	179,308	1.33	2,967	0.02
<b>Water only companies</b>				
Bournemouth & W. Hampshire	2,586	1.91	857	0.63
Bristol	3,371	0.92	86	0.02
Cambridge	2,953	4.82	24	0.04
Dee Valley	2,427	3.00	13	0.02
Essex & Suffolk	7,700	1.50	66	0.01
Folkestone & Dover	1,072	2.40	62	0.14
Mid Kent	5,090	2.95	0	0.00
Portsmouth	1,683	0.65	0	0.00
South East	3,593	0.87	2,461	0.60
South Staffs	3,128	0.71	7	0.00
Sutton & East Surrey	2,876	1.34	280	0.13
Tendring Hundred	4,726	11.45	4,372	10.59
Three Valleys <sup>3</sup>	12,009	1.24	479	0.05
WoC total	53,214	1.43	8,707	0.23
Industry total	232,522	1.35	11,674	0.07

<sup>1</sup> Optional meters are installed at the customer's request. All household customers are entitled to a meter free of charge. Selective meters are installed at the water company's initiative. Companies can only install selective meters in households that have high water use appliances or on change of occupancy.

<sup>2</sup> Percentages are calculated using 1999-2000 unmeasured billed households.

<sup>3</sup> The entries for Three Valleys Water include the combined figures for Three Valleys Water and North Surrey Water.

## APPENDIX 3: WATER DELIVERED COMPONENT DATA

The following Tables contain the 2000-01 data supplied in the 2001 June Return for:

- Water delivered and supplied.
- Populations and number of properties.
- Water used.
- Leakage levels.
- Meter under-registration.

The tables also show a number of simple statistics identifying the assumptions used by companies in deriving some of this information and which highlight anomalous values. These include:

- Percentage of water delivered used by different customer types.
- Household occupancy.
- Household water used and delivered per capita.
- Non-household water delivered per property.
- Estimates of underground supply pipe leakage and total leakage levels.
- Percentage meter under-registration.

Input values are identified by reference to the June Return table and line number. These identify which items companies submit to Ofwat and which are calculated.



Table 11a: Water delivered component data - 2000-01 actuals

	T10 L4	T10 L5	T10 L6	T10 L1	T10 L2	T10 L3	T10 L21	T10 L22	T10 L23	T10 L24
	WATER DELIVERED - BILLED						WATER TAKEN - UNBILLED			WATER
	UNMEASURED			MEASURED			Legally MI/d	Illegally MI/d	Total MI/d	Water delivered MI/d
Household MI/d	Non- h'hold MI/d	Total unmeas'd MI/d	H'hold MI/d	Non h'hold MI/d	Total meas'd MI/d					
<b>Water &amp; sewerage companies</b>										
Anglian	412.7	4.0	416.7	206.5	342.2	548.7	18.7	2.8	21.5	986.8
Dŵr Cymru	433.0	11.5	444.5	23.3	204.1	227.4	7.8	2.2	9.9	681.8
United Utilities	941.5	15.8	957.3	84.1	492.3	576.4	20.8	0.0	20.8	1,554.5
Northumbrian	393.7	18.7	412.4	18.9	193.4	212.2	6.2	3.0	9.2	633.8
Severn Trent	968.0	8.4	976.4	164.0	472.0	636.0	13.0	9.0	22.0	1,634.4
South West	195.8	5.1	200.9	45.0	104.0	149.0	2.5	3.1	5.6	355.5
Southern	309.4	8.2	317.6	56.0	132.9	188.9	7.1	0.0	7.1	513.7
Thames <sup>1</sup>	1,236.3	21.9	1,258.2	184.1	599.6	783.7	15.5	32.0	47.6	2,089.5
Thames (pre MLE) <sup>1</sup>	1,158.7	18.5	1,177.3	180.1	585.9	766.0			36.7	
Wessex	134.9	21.1	156.0	32.0	108.2	140.2	4.4	1.1	5.5	301.7
Yorkshire	573.5	3.2	576.7	96.6	323.4	420.0	14.1	20.9	35.0	1,031.7
WaSC total/average <sup>3</sup>	5,598.7	117.9	5,716.5	910.4	2,972.1	3,882.5	110.1	74.1	184.2	9,783.3
<b>Water only companies</b>										
Bournemouth & W. Hampshire	62.1	1.9	63.9	10.2	63.0	73.2	0.5	0.0	0.5	137.7
Bristol	146.0	6.7	152.7	19.7	74.4	94.1	0.2	0.6	0.8	247.6
Cambridge	25.6	0.9	26.5	14.6	20.0	34.6	0.0	0.2	0.3	61.3
Dee Valley	33.9	0.4	34.3	5.9	22.2	28.0	0.2	0.0	0.2	62.5
Essex & Suffolk	241.6	3.0	244.6	50.1	118.4	168.5	4.6	3.4	8.0	421.1
Folkestone & Dover	21.1	0.4	21.5	5.9	15.2	21.1	0.1	0.0	0.1	42.7
Mid Kent	82.3	1.7	84.0	15.4	37.2	52.6	0.3	0.6	0.9	137.5
Portsmouth	106.8	2.1	108.9	1.8	42.9	44.7	0.0	0.0	0.0	153.6
South East	191.0	7.1	198.1	38.9	75.3	114.2	2.7	0.5	3.1	315.4
South Staffs	179.4	9.2	188.6	16.4	69.7	86.1	3.4	0.0	3.4	278.2
Sutton & East Surrey	98.5	1.3	99.9	11.5	26.0	37.6	0.4	0.0	0.4	137.9
Tendring Hundred	12.9	0.0	12.9	5.6	6.5	12.0	0.1	0.0	0.1	25.0
Three Valleys <sup>2</sup>	492.7	13.9	506.6	62.8	161.9	224.7	6.2	0.0	6.2	737.5
WoC total/average	1,693.8	48.5	1,742.3	258.8	732.6	991.4	18.7	5.3	24.1	2,757.7
Industry total/average <sup>3</sup>	7,292.4	166.4	7,458.8	1,169.2	3,704.7	4,873.9	128.8	79.4	208.3	12,541.0

Note: Numbers may not add due to rounding.

<sup>1</sup> The entries for Thames Water are the product of a 7.2% MLE adjustment. Ofwat does not recommend such large apportionments and as such the numbers should be treated with caution. See page 12 for details. The pre MLE numbers are included to show how Thames Water has reallocated the residual.

<sup>2</sup> The entries for Three Valleys Water include the combined figures for Three Valleys Water and North Surrey Water.

<sup>3</sup> The WaSC and Industry total/average include the Thames Water submitted figures not the pre MLE numbers.

T10 L20 T10 L28 T10 L30			T10 L29	% WATER DELIVERED					T10 L18 C T10 L19 C			
DELIVERED AND INPUT				UNMEASURED		MEASURED		Water taken unbilled	Household measured		Non-household measured	
Operat'l use MI/d	D'buton losses MI/d	D'buton input MI/d	Total leakage MI/d	H'hold %	Non-h'hold %	H'hold %	Non-h'hold %	%	MI/d	%	MI/d	%
14.7	132.3	1,133.9	194.2	41.8	0.4	20.9	34.7	2.2	5.8	2.9	9.8	2.9
7.1	210.4	899.3	260.2	63.5	1.7	3.4	29.9	1.5	0.6	2.6	5.9	3.0
8.4	372.5	1,935.3	463.3	60.6	1.0	5.4	31.7	1.3	1.9	2.2	21.8	4.6
1.6	114.7	750.1	163.6	62.1	3.0	3.0	30.5	1.4	0.5	2.5	6.5	3.5
8.0	225.6	1,868.0	340.2	59.2	0.5	10.0	28.9	1.3	7.0	4.5	30.0	6.8
7.3	66.3	429.1	83.6	55.1	1.4	12.7	29.2	1.6	1.7	4.0	5.2	5.3
1.7	63.0	578.4	91.7	60.2	1.6	10.9	25.9	1.4	1.4	2.5	4.2	3.3
12.1	498.7	2,600.3	687.9	59.2	1.0	8.8	28.7	2.3	4.9	2.8	22.6	3.9
8.7		2,641.9										
6.5	65.0	373.2	84.2	44.7	7.0	10.6	35.9	1.8	1.0	3.1	5.4	5.3
6.8	235.9	1,274.4	304.4	55.6	0.3	9.4	31.3	3.4	3.0	3.2	10.2	3.2
74.2	1,984.4	11,841.9	2,673.2	57.2	1.2	9.3	30.4	1.9	27.7	3.1	121.5	4.3
0.9	15.4	153.9	22.5	45.1	1.3	7.4	45.8	0.4	0.3	3.1	1.4	2.3
2.1	39.7	289.3	54.6	59.0	2.7	8.0	30.0	0.3	0.6	3.2	1.7	2.3
0.0	9.6	70.8	13.3	41.7	1.5	23.8	32.7	0.4	0.4	2.9	0.6	3.1
0.1	7.2	69.8	11.6	54.2	0.7	9.4	35.5	0.2	0.2	3.0	0.7	3.0
2.3	42.5	465.8	72.4	57.4	0.7	11.9	28.1	1.9	1.5	3.0	11.8	11.1
0.1	6.1	48.9	8.6	49.4	0.8	13.9	35.6	0.2	0.1	2.1	0.5	3.1
0.3	18.6	156.4	28.9	59.8	1.2	11.2	27.0	0.7	0.5	3.1	3.3	9.8
0.4	21.6	175.6	30.0	69.5	1.4	1.2	27.9	0.0	0.1	2.8	1.8	4.3
0.7	61.9	377.9	85.4	60.6	2.2	12.3	23.9	1.0	2.0	5.5	5.2	7.3
2.0	49.2	329.3	72.2	64.5	3.3	5.9	25.1	1.2	0.7	4.4	3.9	5.9
0.2	14.7	152.7	24.4	71.5	1.0	8.4	18.9	0.3	0.3	3.0	0.8	3.0
0.1	4.6	29.7	5.5	51.5	0.0	22.2	26.0	0.2	0.2	3.2	0.0	0.5
1.8	89.8	829.1	140.3	66.8	1.9	8.5	22.0	0.8	1.9	3.1	7.3	4.7
10.7	380.8	3,149.2	569.6	61.4	1.8	9.4	26.6	0.9	8.7	3.5	38.8	5.6
85.0	2,365.1	14,991.1	3,242.8	58.1	1.3	9.3	29.5	1.7	36.4	3.2	160.3	4.5

Table 11b: Water delivered component data - 2000-01 actuals

	T7 L11	T7 L16	C	T7 L13	T7 L12	C	T7 L17	C	C
	BILLED PROPERTIES								
	UNMEASURED			MEASURED					Total billed properties
	Household	Non-h'hold	Total unmeas'd	H'hold internal meter	H'hold external meter	H'hold sub-total	Non-h'hold	Total meas'd	(000)
	(000)	(000)	(000)	(000)	(000)	(000)	(000)	(000)	(000)
<b>Water &amp; sewerage companies</b>									
Anglian	915.6	7.0	922.6	48.7	705.5	754.1	104.7	858.9	1,781.5
Dŵr Cymru	1,041.0	15.3	1,056.3	48.0	55.7	103.8	82.1	185.9	1,242.2
United Utilities	2,439.7	22.5	2,462.2	156.2	124.0	280.2	183.1	463.3	2,925.5
Northumbrian	946.5	20.8	967.2	1.4	58.5	59.9	39.7	99.6	1,066.8
Severn Trent	2,365.0	14.0	2,379.0	235.0	325.0	560.0	208.0	768.0	3,147.0
South West	450.6	6.2	456.8	11.9	159.1	170.9	64.3	235.2	692.0
Southern	724.8	15.1	739.9	30.4	146.5	176.9	50.9	227.8	967.6
Thames <sup>1</sup>	2,555.1	23.3	2,578.5	43.2	496.3	539.4	171.7	711.1	3,289.6
Wessex	339.5	8.8	348.3	8.0	108.7	116.7	45.3	162.0	510.3
Yorkshire	1,481.1	21.7	1,502.8	65.3	297.5	362.8	114.6	477.4	1,980.2
WaSC total/average	13,258.9	154.6	13,413.5	648.1	2,476.7	3,124.7	1,064.5	4,189.2	17,602.7
<b>Water only companies</b>									
Bournemouth & W. Hampshire	133.4	1.9	135.3	0.8	33.0	33.8	12.7	46.5	181.8
Bristol	360.1	10.0	370.1	8.8	59.9	68.7	32.0	100.7	470.9
Cambridge	58.0	1.2	59.2	26.2	22.3	48.5	8.6	57.1	116.3
Dee Valley	78.4	0.9	79.3	1.5	21.7	23.2	7.4	30.6	109.9
Essex & Suffolk	489.9	4.1	494.0	28.6	154.9	183.5	37.1	220.6	714.6
Folkestone & Dover	43.6	0.9	44.4	0.4	19.9	20.3	4.1	24.4	68.9
Mid Kent	168.9	2.0	170.9	0.5	42.1	42.7	18.9	61.6	232.5
Portsmouth	259.0	2.9	261.9	0.0	4.9	4.9	14.7	19.7	281.5
South East	408.9	8.1	416.9	0.3	113.4	113.7	32.4	146.1	563.0
South Staffs	438.2	10.3	448.5	2.3	47.5	49.8	21.7	71.4	519.9
Sutton & East Surrey	211.4	2.8	214.2	0.1	32.9	33.0	13.2	46.2	260.4
Tendring Hundred	36.7	0.1	36.8	1.0	24.7	25.7	4.7	30.3	67.2
Three Valleys <sup>2</sup>	957.1	12.5	969.6	10.9	160.3	171.2	54.2	225.4	1,195.0
WoC total/average	3,643.5	57.6	3,701.2	81.3	737.5	818.9	261.7	1,080.6	4,781.8
Industry total/average	16,902.5	212.2	17,114.7	729.4	3,214.2	3,943.6	1,326.2	5,269.8	22,384.5

Note: Numbers may not add due to rounding.

<sup>1</sup> The entries for Thames Water are the product of a 7.2% MLE adjustment. Ofwat does not recommend such large apportionments and as such the numbers should be treated with caution. See page 12 for details.

<sup>2</sup> The entries for Three Valleys Water include the combined figures for Three Valleys Water and North Surrey Water.

T7 L14		T7 L15		T7 L18		T7 L19		C		T7 L31		T7 L33		T7 L32		T7 L34		C		C		
CONNECTED PROPERTIES					POPULATION					OCCUPANCY												
HOUSEHOLD		NON-HOUSEHOLD			Total connected properties (000)	UNMEASURED		MEASURED		Total populat'n (000)	Unmeas'd h'hold	Meas'd h'hold	Total h'hold									
Billed (000)	Connected (000)	Billed (000)	Connected (000)	H'holds (000)		Non- h'holds (000)	H'holds (000)	Non- h'holds (000)														
1,669.8	1,736.4	111.7	124.3	1,860.7	2,397.7	0.2	1,677.1	159.3	4,234.2	2.6	2.2	2.4										
1,144.8	1,195.7	97.4	109.4	1,305.1	2,660.9	20.3	146.3	31.5	2,859.0	2.6	1.4	2.5										
2,719.9	2,858.6	205.6	241.2	3,099.7	6,131.3	20.7	593.1	104.7	6,849.8	2.5	2.1	2.5										
1,006.3	1,055.1	60.5	76.8	1,131.9	2,377.8	4.1	134.5	23.8	2,540.1	2.5	2.2	2.5										
2,925.0	2,987.0	222.0	238.0	3,225.0	6,227.0	0.0	1,155.0	0.0	7,382.0	2.6	2.1	2.5										
621.5	638.5	70.5	74.9	713.4	1,158.8	0.0	336.4	45.0	1,540.2	2.6	2.0	2.4										
901.7	924.3	66.0	70.8	995.1	1,820.1	9.0	364.2	30.0	2,223.3	2.5	2.1	2.4										
3,094.6	3,186.0	195.0	258.1	3,444.1	6,423.1	0.0	1,128.4	300.3	7,851.8	2.5	2.1	2.4										
456.2	465.1	54.1	55.4	520.5	832.5	96.9	232.3	24.6	1,186.3	2.5	2.0	2.3										
1,843.9	1,935.9	136.3	152.5	2,088.4	3,693.9	11.1	689.2	313.7	4,707.9	2.5	1.9	2.4										
16,383.7	16,982.4	1,219.1	1,401.4	18,383.8	33,723.1	162.2	6,456.4	1,032.8	41,374.5	2.5	2.1	2.5										
167.2	170.5	14.6	15.2	185.8	338.6	1.2	69.3	22.6	431.7	2.5	2.1	2.4										
428.8	435.2	42.1	44.1	479.2	899.9	2.9	137.4	32.6	1,072.8	2.5	2.0	2.4										
106.5	108.3	9.8	10.2	118.5	161.2	5.7	102.2	22.1	291.2	2.8	2.1	2.5										
101.6	105.3	8.3	9.7	115.0	202.4	0.8	48.2	5.7	257.0	2.6	2.1	2.5										
673.4	703.9	41.2	47.0	751.0	1,351.5	2.0	333.9	20.2	1,707.6	2.8	1.8	2.5										
63.8	65.6	5.0	5.9	71.5	119.7	0.0	38.5	3.6	161.8	2.7	1.9	2.5										
211.6	215.3	20.9	22.4	237.7	441.3	2.3	103.5	22.0	569.1	2.6	2.4	2.6										
263.9	269.1	17.6	17.7	286.7	631.1	2.5	10.4	10.7	654.8	2.4	2.1	2.4										
522.6	537.7	40.5	44.3	582.0	1,069.0	25.7	235.9	79.3	1,409.9	2.6	2.1	2.5										
488.0	501.9	32.0	38.9	540.8	1,113.0	4.0	110.0	5.0	1,232.0	2.5	2.2	2.5										
244.4	249.2	16.0	18.6	267.8	547.3	1.5	76.6	11.9	637.3	2.6	2.3	2.6										
62.4	64.0	4.8	5.1	69.2	92.0	0.0	50.3	2.9	145.2	2.5	2.0	2.3										
1,128.3	1,139.9	66.7	72.6	1,212.5	2,555.9	5.3	367.0	5.0	2,933.1	2.7	2.1	2.6										
4,462.4	4,566.0	319.3	351.7	4,917.7	9,523.0	53.8	1,683.1	243.6	11,503.6	2.6	2.1	2.5										
20,846.1	21,548.4	1,538.4	1,753.1	23,301.5	43,246.0	216.1	8,139.6	1,276.4	52,878.1	2.6	2.1	2.5										

Table 11c: Water delivered component data - 2000-01 actuals

	C T10 L11 WATER DELIVERED				T10 L12 T10 L13 PER CAPITA CONSUMPTION (excluding supply pipe leakage)		
	UNMEASURED		MEASURED		Unmeasured household l/head/d	Measured household l/head/d	Average household l/head/d
	Household l/head/d	Non-household l/prop/d	Household l/head/d	Non-household l/prop/d			
<b>Water &amp; sewerage companies</b>							
Anglian	172.1	564.0	123.1	3,266.8	155.2	113.9	138.2
Dŵr Cymru	162.7	753.6	159.0	2,485.7	146.9	138.1	146.4
United Utilities	153.6	702.5	141.8	2,689.3	140.8	135.1	140.3
Northumbrian	165.6	901.5	140.2	4,866.1	147.6	129.9	146.6
Severn Trent	155.5	600.0	142.0	2,269.2	139.9	131.4	138.6
South West	168.9	823.8	133.8	1,617.3	156.8	128.5	150.5
Southern	170.0	545.2	153.8	2,610.8	158.0	141.7	155.3
Thames <sup>1</sup>	192.5	939.2	163.2	3,492.2	166.6	154.4	164.8
Wessex	162.0	2,401.1	137.7	2,389.0	143.0	130.0	140.2
Yorkshire	155.3	145.7	140.2	2,821.8	140.2	130.7	138.7
WaSC total/average	166.0	762.5	141.0	2,792.1	149.0	131.6	146.2
<b>Water only companies</b>							
Bournemouth & W. Hampshire	183.3	989.3	147.3	4,963.0	166.0	136.4	161.0
Bristol	162.2	665.3	143.4	2,322.2	149.8	127.9	146.9
Cambridge	158.6	748.5	142.5	2,335.2	145.6	129.4	139.3
Dee Valley	167.3	475.7	121.9	2,992.2	149.1	115.9	142.7
Essex & Suffolk	178.8	725.9	149.9	3,195.0	162.1	136.1	156.9
Folkestone & Dover	176.4	399.5	154.5	3,668.0	159.7	146.8	156.5
Mid Kent	186.4	866.3	148.9	1,969.1	166.7	140.5	161.8
Portsmouth	169.3	716.5	176.9	2,912.1	156.9	167.4	157.1
South East	178.7	878.6	164.8	2,322.3	160.9	153.2	159.5
South Staffs	161.2	898.3	149.3	3,216.0	143.4	137.1	142.9
Sutton & East Surrey	180.0	475.0	150.7	1,966.6	164.6	142.0	161.8
Tendring Hundred	139.8	100.0	110.3	1,391.8	131.8	109.5	123.9
Three Valleys <sup>2</sup>	192.8	1,110.4	171.1	2,987.0	175.3	161.5	173.6
WoC total/average	177.9	841.6	153.8	2,799.4	161.4	142.6	158.6
Industry total/average	168.6	784.0	143.6	2,793.5	151.7	133.9	148.9

Note: Numbers may not add due to rounding.

<sup>1</sup> The entries for Thames Water are the product of a 7.2% MLE adjustment. Ofwat does not recommend such large apportionments and as such the numbers should be treated with caution. See page 12 for details.

<sup>2</sup> The entries for Three Valleys Water include the combined figures for Three Valleys Water and North Surrey Water.

T10 L14	T10 L15	T10 L16	T10 L17	C	C	C	C	C
SUPPLY PIPE LEAKAGE					TOTAL LEAKAGE			
Unmeasured household l/prop/d	Externally metered household l/prop/d	Internally metered household l/prop/d	Void properties l/prop/d	Proportion of total leakage %	Total supply pipe leakage l/prop/d	Distribution losses l/prop/d	Total leakage l/prop/d	Total leakage m <sup>3</sup> /km/d
44.3	19.0	44.6	43.3	31.9	33.2	71.1	104.4	5.3
40.5	19.9	40.5	36.6	19.1	38.1	161.2	199.3	9.7
32.1	11.9	16.1	32.1	19.6	29.3	120.2	149.4	11.4
45.2	22.6	45.2	45.2	29.9	43.2	101.3	144.5	9.8
41.0	8.0	41.0	41.0	33.7	35.5	70.0	105.5	7.9
31.1	9.0	31.1	31.1	20.6	24.2	93.0	117.2	5.6
30.0	24.0	30.0	30.0	31.3	28.8	63.3	92.1	6.9
65.0	14.9	59.5	59.5	27.5	54.9	144.8	199.7	21.6
46.6	16.4	0.0	46.6	22.8	36.9	124.9	161.8	7.5
37.4	13.8	37.4	38.6	22.5	32.8	112.9	145.8	9.8
43.3	15.4	34.9	42.0	25.8	37.5	107.9	145.4	10.0
44.0	22.0	44.0	44.0	31.8	38.6	82.6	121.2	8.1
31.0	31.0	31.0	31.0	27.2	31.0	82.8	113.8	8.4
36.0	18.0	36.0	36.0	28.0	31.3	80.6	111.9	6.0
46.8	10.0	49.1	46.6	37.3	37.5	63.0	100.5	5.9
46.1	21.8	43.9	47.1	41.4	39.9	56.5	96.4	8.6
46.0	14.0	46.0	38.6	29.1	35.0	85.3	120.3	8.1
51.4	20.0	51.4	51.4	35.7	43.3	78.2	121.5	6.9
30.0	20.0	20.0	30.0	28.0	29.3	75.4	104.7	9.3
46.4	23.9	46.4	37.5	27.6	40.5	106.3	146.8	8.9
45.0	26.0	45.0	45.0	31.9	42.6	91.0	133.5	12.5
40.0	20.0	40.0	34.3	39.9	36.4	54.8	91.2	7.2
20.0	0.7	20.0	18.0	14.9	11.7	67.1	78.8	6.1
46.6	18.8	46.5	45.5	36.0	41.6	74.1	115.7	10.1
42.9	20.9	40.2	42.2	33.2	38.4	77.4	115.8	8.9
43.2	16.7	35.5	42.0	27.1	37.7	101.5	139.2	9.8

**Summary of the agreed steps<sup>1</sup> to be taken by Thames Water Utilities Ltd to achieve economic levels of leakage and adequate security of supply in each of its zones.**

### A Economic level of leakage

**Objective: To develop a robust assessment of the economic level of leakage and to achieve leakage at the economic level for report year 2003-04.**

Agreed steps:

1. Submit full update(s) of the 'London is Different' analysis accompanied by the views of the Reporter following his audit of the analysis.

Timetable:

- (i) Draft update by 14 December 2001;
- (ii) First full update by 26 July 2002;
- (iii) Publication by autumn 2002;
- (iv) Second and final update by 2 July 2004.

2. Re-assessment of Thames Water's economic level of leakage.

Timetable:

- (i) Submit full ELL assessment by 31 July 2001;
- (ii) Response with sensitivity analysis addressing questions raised by Ofwat, Reporter and EA on (i) by 14 December 2001;
- (iii) First update to reflect data for 2001-02 by 26 July 2002;
- (iv) Second update to reflect data for 2002-03 by 25 July 2003;
- (v) Third and final update to reflect available data for 2003-04 and included in the TMS periodic review business plan (likely April 2004).

3. Set down the company's strategy to achieve the economic level of leakage.

Timetable:

- (i) Initial programme, covering two-year period from Q4/2001-02, by 14 December 2001;
- (ii) Revised programme in the light of achievements and further data in 2001-02, covering the following two year period, by 26 July 2002;
- (iii) Revised programme in the light of achievements in 2002-03 and further data, covering the following two years, by 25 July 2003.

4. Leakage control – quarterly reporting of progress.

Timetable:

Continue reporting on quarterly basis until Q1 2004-05.

### B Robust water balance

**Objective: To establish a robust water balance for the Company**

Agreed steps:

1. Review all components of the water balance in order to bring the unexplained component of distribution input into line with industry norms by report year 2003-04.

Timetable:

- (i) Include progress reports with each quarterly report on leakage;
- (ii) Company-wide balances for 2001-02 with JR02;
- (iii) Company-wide balances for 2002-03 with JR03;
- (iv) Company-wide balances for 2003-04 with JR04.

<sup>1</sup> Unless specifically noted otherwise, the Reporter will be required to review and report to Ofwat on all the agreed steps.

---

## C Security of supplies to customers

**Objective: To produce and implement a long term resource plan to achieve target headroom by 2003-04 (March 2004) and maintain it thereafter.**

Agreed steps:

1. To produce and implement the current least cost supply/demand programme to achieve target headroom in 2003-04.

Timetable:

- (i) Revised programme by end of July 2001;
- (ii) Reporter to identify any major issues/concerns by mid-August and submit his final report on the programme by 7 September 2001;
- (iii) Submit economic model and input data sets to both Ofwat and the EA region by 28 September 2001;
- (iv) Update the public domain AMP3 Monitoring Plan, consistent with the revised programme by the end of September 2001;
- (v) Report quarterly on progress and review programme on a six-monthly basis.

2. Prepare revised long-term supply demand balance programme. Develop a robust plan to maintain adequate security of supplies to customers in the medium to long term (15+ years).

Timetable:

- (i) Update of the 1999 business plan long-term supply demand programme to reflect data for 2001-02 by 26 July 2002;
- (ii) Update to reflect data for 2002-03 to be included in the PR04 draft business plan;
- (iii) Final update to reflect available data for 2003-04 included in PR04 business plan (likely to be April 2004).

In addition we have agreed to explain to Thames Water how any efficient additional expenditure needed to balance supply and demand in the AMP3 period (2000-05) will be taken into account of in price limits set at the next periodic review.



## APPENDIX 5: COMPANY POLICY ON HOUSEHOLD SUPPLY PIPE REPAIRS AND REPLACEMENTS

Company	Free supply pipe repair policy			
	First leak only	Only owner occupied properties	External leaks only	Other restrictions on supply pipe repairs
Anglian <sup>1</sup>			●	Full reinstatement to original surface where reasonably practicable.
Dŵr Cymru (Welsh)	●		●	One leak repair grant in a three year period to customers repairing own leak. Replacement encouraged if pipework is in poor condition, if leak is on underground supply pipe inside the house or if supply pipe is lead, and for subsequent leaks.
United Utilities			●	External leaks under buildings not covered. Free repair for internal leaks on a common supply pipe. External common supply pipes can be installed free if an internal CSP pipe is prone to repair/replacement problems.
Northumbrian			●	Pipework should not be larger than 50mm diameter, longer than 50m and the leak must not be under a building or other substantial structure.
Severn Trent			●	Repairs are not undertaken where leaks are on internal pipework/plumbing, where pipework is under or adjacent to buildings, where pipes are on the property of third parties, where the repair may be an unacceptable or unquantifiable risk, liability or cost to the company. Free repairs restricted to two in any two year period.
South West	●		●	Free repair for service pipes under 15m long, £60 for pipes longer than 15 metres. If more than one leak is found at the time the repair is carried out, each further leak will be repaired for £30. No or part funded repairs where leak is beneath the building/structure or is on internal plumbing.
Southern	●		●	First repair is free. Up to one hour free leak detection service. Repairs/replacements to the first structural wall.
Thames	●	●	●	Will replace section of supply pipe up to 5m if impractical to repair, repair guaranteed for one year. The pipe between the internal stop valve and outside stop valve is eligible for repair. The offer does not apply to internal pipework.
Wessex			●	Free repair or replacement provided the pipework does not pass under any structure. Repair or replacement up to outside wall of dwelling.
Yorkshire <sup>2</sup>			●	If repair/renewal costs exceed £1000, reserve the right to ask for a contribution from the customer. No repair where leak under a building. Free repairs offered only to wholly domestic dwellings, places of worship, sheltered housing and residential homes.
Bournemouth & W. Hampshire	●		●	One Repair per property; one hour free leak detection. Repairs at rented properties at the company's discretion. Pipework under buildings not covered.
Bristol	●	●	●	Pipe must be less than 1.5m deep. Repairs for subsequent leaks offered at £94; first internal leak repair up to stop tap offered at same price £94. No repair where pipework under a building. Full reinstatement except for specialist materials.
Cambridge	●		●	Free repair, applies to the first leak only. No repair where pipework under a building.
Dee Valley	●	●	●	First leak only or up to 5m replacement free if uneconomic to repair. There must be reasonable access to the leak.
Essex & Suffolk			●	For first 50m and for pipes with a nominal bore no greater than 20mm. Limited to a maximum estimated cost (before commencement) of £500. No repair where pipework under buildings.
Folkestone & Dover	●		●	Maximum second repair cost of £75 + VAT if leak occurs within two years of first leak; £150 + VAT for subsequent leaks within two years.
Mid Kent	●	●	●	One free repair (up to limit of £300 excl. VAT) during the life of the property; 30 mins free leak detection. Where a customer wishes to effect a leakage repair themselves, the company will credit the customer's water account with £150 (subject to a pre and post site inspection).
North Surrey	●		●	Subsidised replacement if pipe is beyond sensible repair.
Portsmouth	●	●	●	Pipes under buildings not covered.
South East	●	●	●	Free repair or £100 rebate off next water bill if customer renews supply pipe, provided the customer responds to the contact letter within 7 days. This offer applies to the first leak at private owned domestic properties only.
South Staffs	●	●	●	Subsidised replacement if pipe is in bad condition. Repair must be arranged within 14 days of notifying the company. One repair per property. Pipes under a building or permanent structure are excluded.
Sutton & East Surrey	●	●	●	Free for first four man hours only, £25 per man hour over four hours. One free repair per property.
Tendring Hundred	●		●	Free repair for pipes up to 25m long, and 25mm diameter. Subsidised repair for longer pipes. Pipes under buildings not covered. Company may opt to replace rather than repair the pipe. Repairs not always restricted to the first repair – each case considered on individual merits.
Three Valleys	●		●	Free repairs for privately owned households whose pipe does not exceed 25mm external diameter. May charge for pipes longer than 10m, after an initial one hour assessment. Pipes under buildings not covered.

<sup>1</sup> Anglian's policies also apply in the Hartlepool region.

<sup>2</sup> Yorkshire's policies also apply in the York region.

Supply pipe replacement policy

Some replacements free	Subsidised replacement	Use of waste notices	Reinstatement policy	Other restrictions on supply pipe replacements
●	●	b	f	Replacement of supply pipes is free up to 25m. Beyond 25m charge will be £11.75 per m. Full reinstatement to original surface where reasonably practicable. Pipes under buildings are not covered.
●	●	b	e	£100 grant towards the cost of replacement offered if pipe is in poor condition. £100 grant towards the replacement of a lead supply.
●		b	e	Offers an insurance service, 'Homecare' to provide cover against the risk of damage arising from leaks within the property. If pipe is prone to leaks, policy is to repair free of charge.
●	●	b	f	Will either replace a supply pipe free (if this is cheaper than repairing the leak) or offer a subsidised replacement. Will replace pipe if prone to leaks.
●	●	b	e	Up to £150 subsidy for replacement in exceptional circumstances.
●	●	b	e/f	Grant of £100 towards replacement cost offered. For joint service pipes, if all customers lay new services at their own expense, new connections charged at £60 each. Pipes under permanent buildings are not included.
●	●	b	e	Free replacement of supply pipes up to 10m if they are found to be leaking and made of lead.
		c	e	Applies to <50mm pipes only. £150 for replacement up to 10m, additional £15 /m for longer lengths up to max of 50m; guaranteed for 10 years; £150 charge for cutting new entry point.
		b	f	Replacement at discretion of company. All replacements free. Full reinstatement to surface as near as possible to original.
●	●	a	f	If repair/renewal costs exceed £1000, reserve the right to ask for a contribution from the customer.
●	●	b	e	Up to 1.5m of poor condition pipe will be replaced free, otherwise £200 subsidy is given on replacement costs.
		a	f	
	●	d	e/f	Replacement following a free repair is at a subsidised cost of £203 inc VAT (up to 20 metres).
●		c	e/f	If repair uneconomical, will replace up to 5m free. Over 5m will quote for additional work. Reinstatement does not include specialist finishes.
●	●	c	e	An allowance of £250 towards the cost of replacement is offered. Pipes under buildings not covered.
	●	b	f	Full reinstatement does not include specialist surfacing materials. Subsidised scheme £100 for up to 10m then £10 per m for metered supplies (£150 for up to 10m then £15 per m for unmetered supplies).
	●	c	e	Where pipe beyond economic repair or location of leak not readily identifiable, company will contribute up to £300 towards replacement. If a second leak occurs within a year of the first repair, then company may require the customer to replace the pipe at their own expense.
	●	c	e	Subsidised replacement for second leak if beyond sensible repair. £50 for first 10m, then £10 per m for metered supplies (£150 for first 10m, then £10 per m for unmetered). Pipes under buildings are not covered
●	●	b	e/f	50% subsidy up to £150 for pipes found in poor condition on all mains and service pipe renewal schemes.
	●	c	e	Free repair or £100 rebate off next water bill if customer renews supply pipe, provided the customer responds to the contact letter within 7 days. This offer applies to the first leak at private owned domestic properties only.
	●	a	f	Full reinstatement does not include specialist surfacing materials such as printed concrete, coloured bitumastics, block paving, etc.
	●	c	e	Subsidised supply pipe replacement where Company considers pipework is beyond repair. If replacement more economic than repair, will offer to renew pipe – £150 + VAT up to 10m and £15 + VAT for each extra metre.
●	●	b	e/f	Subsidised replacement for subsequent leaks. Full reinstatement restricted to black top. Replacements normally exclude pipes under buildings.
●	●	b	e	Up to 10 metres free. Customer is not limited to one free repair. Pipework between 10-50 metres subsidised fee of £15 per metre. Pipework over 50 metres receives discount of £200.

Use of waste notices

- a Always
- b If appropriate
- c If customer fails to respond within 14 days
- d Not used

Reinstatement policy

- e Backfill to safe condition
- f Full reinstatement
- e/f Full reinstatement restricted to black top or bare earth









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