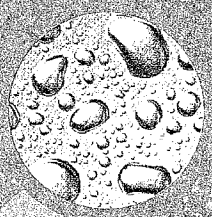
WATER SERVICES ASSOCIATION

STATISTICS
COPY 2

water facts '97

Foreword



The past year has been historic for the water industry in more ways than one.

Historic for the meeting of minds between the water companies and the new Government on ways of tackling water resource problems, crystallised by the Government's water summit only days after taking office.

Historic in the continuation of the long run of dry weather, which culminated in the longest sustained period of low rainfall since records began.

Historic in that many companies were learning to operate their systems with ground water levels lower than they had ever been.

And historic in the speed and scale by which the water companies cut their leakage rates - unprecedented in the records of the industry.

During the year 1996/97, the major water service companies alone invested £2,900 million - well over 20 per cent up on the previous year - to bring total investment by the companies since 1989 to over £21,000 million.

Last year's 'new look' seems to have been well received. Demand for WaterFacts was higher than ever before. But remember, readers' comments and suggestions are always warmly welcomed. They have played a big part in the development of this essential compendium from its earliest days. Good reading!

Sue Tabb
Editor

19623

Waterfacts 1997

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The editor would like to thank the following for their assistance in compiling Waterfacts '97:

Jeanne Golay, Julie Hesketh, Steve Hollins, Gordon Simmons, Brian Spark, Ted Thairs, Richard Venters, Robert Weeden (WSA); Mike Walker (WCA); Andrew Snelson (Anglian Water); Phil Bendry (Dŵr Cymru Welsh Water) Jean Nichols (Northumbrian Water); Suzanne Harper (North West Water); Andrew Whitehouse (Severn Trent Water); Chris Kneale (Southern Water); Andrew Suckley (South West Water); Alyson Hawkins (Thames Water); Sue Lindsay (Wessex Water); Matthew Cherrington (Yorkshire Water); Rodney Neill (DoE (NI) Water Service; Howard Hooper (The Scottish Office).

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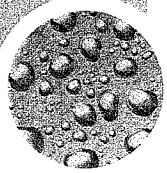
1 Organisation of water services



In England and Wales there are two types of water company, both in the private sector. In Scotland water and sewerage services are provided by the three new water authorities while in Northern Ireland services are provided by local authorities through the Water Service, part of the DoE (NI).

The ten English and Welsh water service companies (WSCs), the successors to the former water authorities, were privatised in 1989. Together they supply water to 80% of the population and sewerage services to virtually everyone.

There are also 19 water companies that supply water only which have always been in the private sector and supply water to 20% of the population. The water supply companies and the areas they supply are shown on map 1.3. They have no responsibilities for sewerage services which are provided in their areas by the water service companies.

The water service companies and the water supply companies are all regulated by OFWAT. The water service companies are subsidiaries of plcs not themselves regulated. In recent years some of the water supply companies have opted for plc status. The water companies presently belong to two trade associations.

1.1 Formal titles of the water service companies

Regulated companies	Owned by
Anglian Water Services Ltd	Anglian Water plc
Dŵr Cymru Cyfyngedig (Welsh Water)	Hyder plc
Northumbrian Water Ltd	Lyonnaise des Eaux SA
North West Water Ltd	United Utilities plc
Severn Trent Water Ltd	Severn Trent plc
Southern Water Services Ltd	Scottish Power plc
South West Water Services Ltd	South West Water plc
Thames Water Utilities Ltd	Thames Water plc
Wessex Water Services Ltd	Wessex Water plc
Yorkshire Water Services Ltd	Yorkshire Water plc

Details of Board members and Chief Officers of each of the companies are listed in *Who's Who in the Water Industry*. This publication also provides information on other organisations related to the UK water industry. *Who's Who* is published each year for the Water Services Association by Turrett RAI plc, Armstrong House, 38 Market Square, Uxbridge, Middlesex UB8 1TG. Tel: 01895 454545. Fax: 01895 454647.

WATER SERVICES ASSOCIATION (WSA)
1 Queen Anne's Gate, London SW1H 9BT
Tel: 0171 957 4567 • Fax: 0171 957 4666
e-mail: wsa@water-services.co.uk
Web address: www.water-services.co.uk

The WSA is an association of the major water service companies of England and Wales. They provide drinking water to about 80% of the country's population and sewerage services to virtually everyone. The WSA's principal role is:

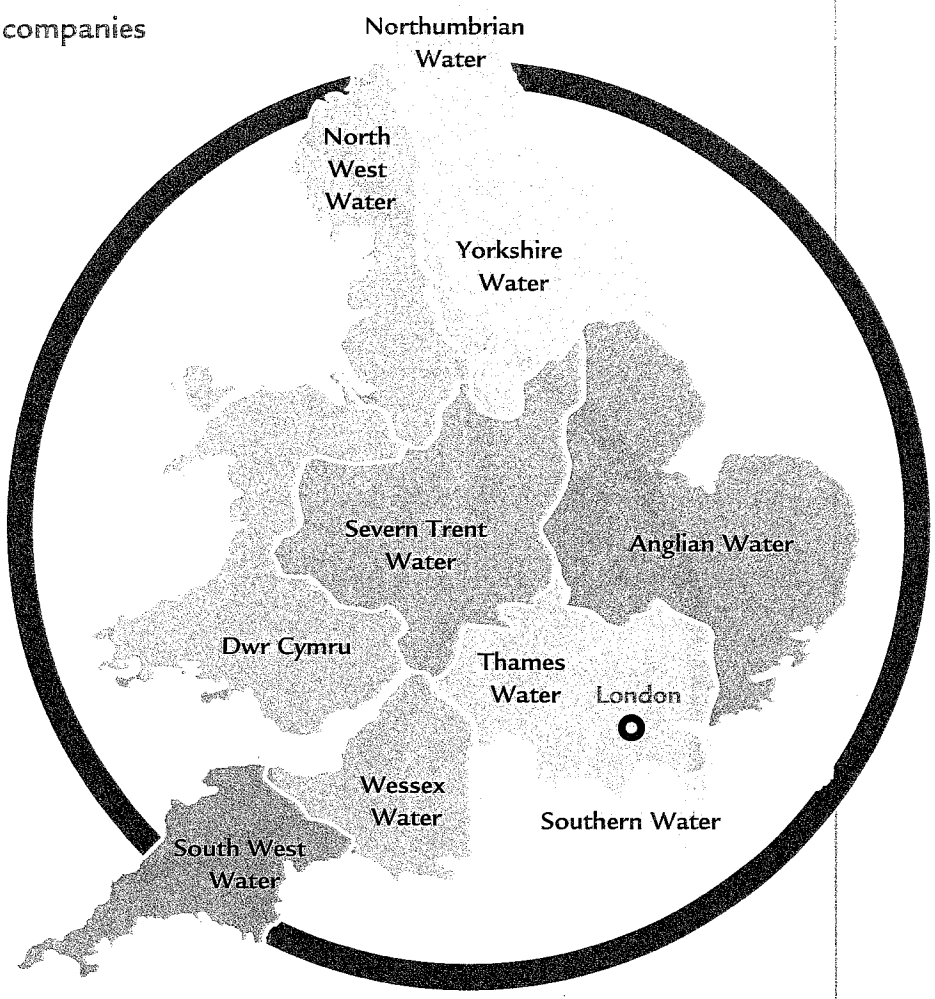
- to protect the common interests of its members and to promote a positive view of the work they do
- to influence policy and regulatory initiatives on water issues by governmental and other agencies, both national and international.

The WSA is governed by a Council of its members, currently one member from each of nine water service companies.

WATER COMPANIES' ASSOCIATION (WCA)
1 Queen Anne's Gate, London SW1H 9BT
Tel: 0171 222 0644 • Fax: 0171 222 3366
e-mail: waterco@msn.com

The Water Companies' Association was formed in 1885 and promotes the interests of the water supply companies. The Association provides a collective voice for these companies and encourages improvement and cooperation between its members, acting both as initiator and a channel for communication.

1.2 Water service companies



Anglian Water

Anglian House
Ambury Road
Huntingdon
Cambs PE18 6NZ

Tel: 01480 323000
Fax: 01480 323115

www.anglianwater.co.uk

Dŵr Cymru

Plas-y-Ffynnon
Cambrian Way
Brecon Powys LD3 7HP

Tel: 01874 623181
Fax: 01874 624167

North West Water

Dawson House
Great Sankey
Warrington
WA5 3LW

Tel: 01925 234000
Fax: 01925 233360

Severn Trent Water

2297 Coventry Road
Birmingham
B26 3PU

Tel: 0121 722 4000
Fax: 0121 722 4800
www.severn-trent.com

South West Water

Peninsula House
Rydon Lane
Exeter EX2 7HR

Tel: 01392 446688
Fax: 01392 434966
www.swwater.co.uk

Wessex Water

Wessex House
Passage Street
Bristol BS2 0JQ

Tel: 0117 929 0611
Fax: 0117 929 3137

Northumbrian Water

Abbey Road
Pity Me
Durham
DH1 5FJ

Tel: 0191 383 2222
Fax: 0191 384 1920

Southern Water

Yeoman Road
Worthing
West Sussex
BN13 3NX

Tel: 01903 264444
Fax: 01903 262185

Thames Water

Nugent House
Vastern Road
Reading RG1 8DB

Tel: 0118 959 1159
Fax: 0118 959 3203

Yorkshire Water

Western House
Western Way
Halifax Road
Bradford BD6 2LZ

Tel: 01274 691111
Fax: 01274 604764

1.3 Water supply companies

1 Bournemouth & West Hampshire Water Plc
Tel: 01202 591111
Fax: 01202 597022

2 Bristol Water Plc
Tel: 0117 966 5881
Fax: 0117 963 4576

3 Cambridge Water Company
Tel: 01223 403000
Fax: 01223 403052

4 Cholderton & District Water Company Ltd
Tel: 01980 629203
Fax: 01980 629307

5 Dee Valley Water Plc (incorporating Wrexham Water Plc and Chester Waterworks Company)
Tel: 01978 846946
Fax: 01978 846888

6 Essex & Suffolk Water Plc
Tel: 01245 491234
Fax: 01245 212345

7 Folkestone & Dover Water Services Ltd
Tel: 01303 276951
Fax: 01303 276712

8 Hartlepool Water Plc
Tel: 01429 868555
Fax: 01429 858000

9 Mid Kent Water Plc
Tel: 01634 240313
Fax: 01634 242764

10 Mid Southern Water Plc
Tel: 01252 835031
Fax: 01252 836066

11 North Surrey Water Limited
Tel: 01784 455464
Fax: 01784 426333

12 Portsmouth Water Plc
Tel: 01705 499888
Fax: 01705 453632

13 South East Water Ltd
Tel: 01323 411411
Fax: 01323 648237

14 South Staffordshire Water Plc
Tel: 01922 38282
Fax: 01922 21968

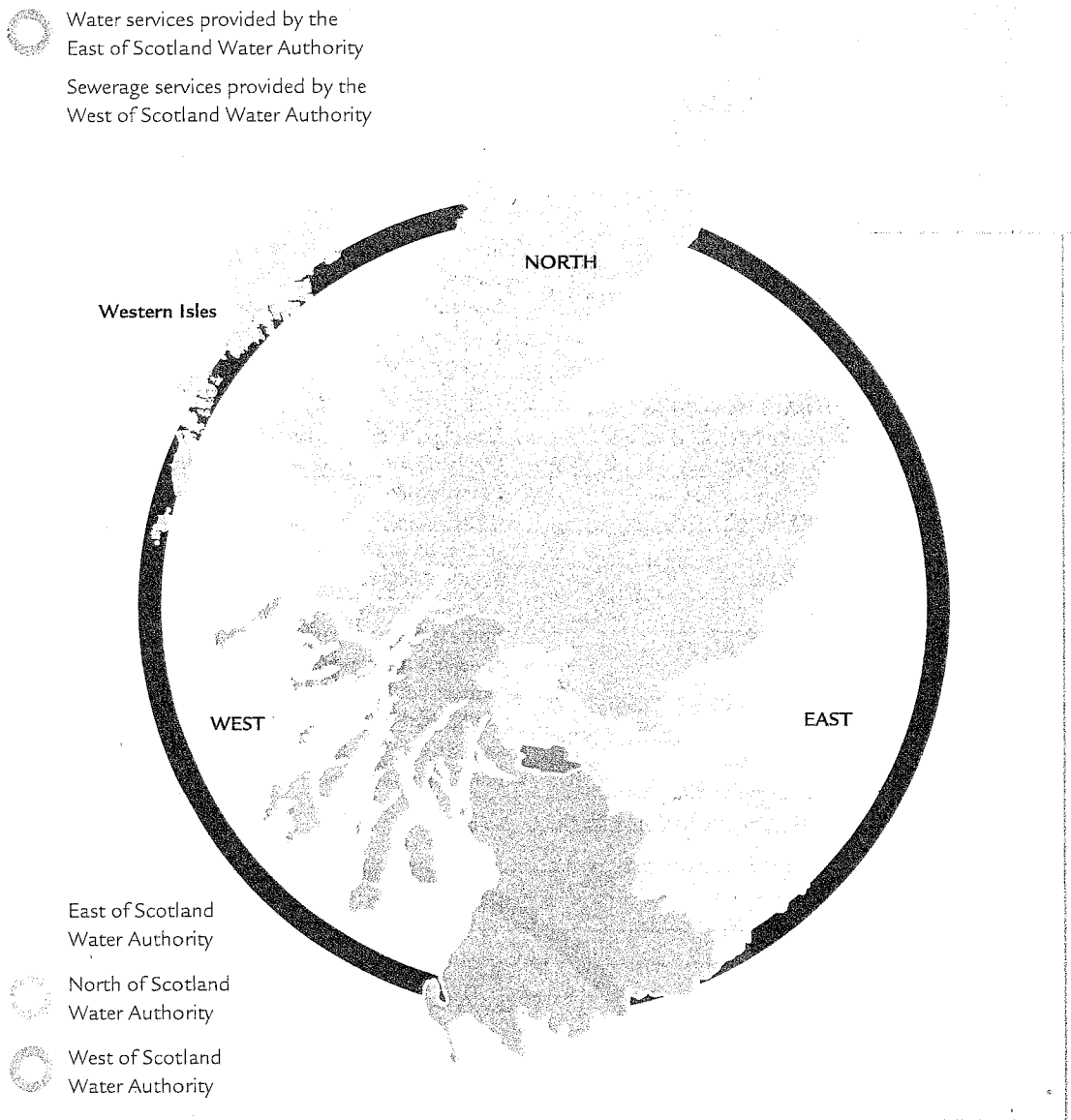
15 Sutton & East Surrey Water Plc
Tel: 01737 772000
Fax: 01737 766807

16 Tendring Hundred Water Services Ltd
Tel: 01206 399200
Fax: 01206 399210

17 Three Valleys Water Plc
Tel: 01707 268111
Fax: 01707 277333

18 York Waterworks Plc
Tel: 01904 622171
Fax: 01904 611667

1.4 Scottish Water Authorities



WATER IN SCOTLAND

Scottish Office, Agriculture, Environment and Fisheries Department, Environmental Affairs Group, Water Services Unit, Victoria Quay, Edinburgh EH6 6QQ
Tel: 0131 244 0248 • Fax: 0131 244 0259.

The Local Government etc. (Scotland) Act 1994 provided for the establishment of the new water authorities in parallel with the replacement of the 65 regions, islands and district councils with 32 single-tier local authorities. The water authorities were established in June 1995 and took responsibility for providing the services on 1 April 1996.

The areas of responsibility for the water authorities, generally follow the former local authority boundaries.

East of Scotland Water Authority

Pentland Gait, 597 Calder Road, Edinburgh EH11 4HJ
Tel: 0131 453 7500 • Fax: 0131 453 7558
Lothian, Borders, Fife and Central Regions, and Kinross District and for water supply only, a small part of Strathclyde. This authority also took over most of the business of the Central Scotland Water Development Board.

North of Scotland Water Authority

Cairngorm House, Beechwood Park North, Inverness IV2 3ED
Tel: 01463 245400 • Fax: 01463 245405
Highland and Grampian Regions, the three island areas and Tayside excluding Kinross.

West of Scotland Water Authority
419 Balmore Road, Glasgow G22 6NU
Tel: 0141 355 5333 • Fax: 0141 355 5146
Dumfries and Galloway and Strathclyde Region except for a small area for water supply.

The duties of the authorities are to provide an efficient and cost effective delivery of water and sewerage services which meet water quality and environmental standards. They are encouraged to seek private finance for capital investment within the terms of the Private Finance Initiative.

An independent body, the Scottish Water and Sewerage Customers' Council represents consumers' interests. Its role is to monitor the performance of the three authorities in all matters relevant to consumers. This includes investigating complaints and advising the Secretary of State on the standards of service and customer relations with the authorities. It is also involved in approving charging schemes.

WATER IN NORTHERN IRELAND

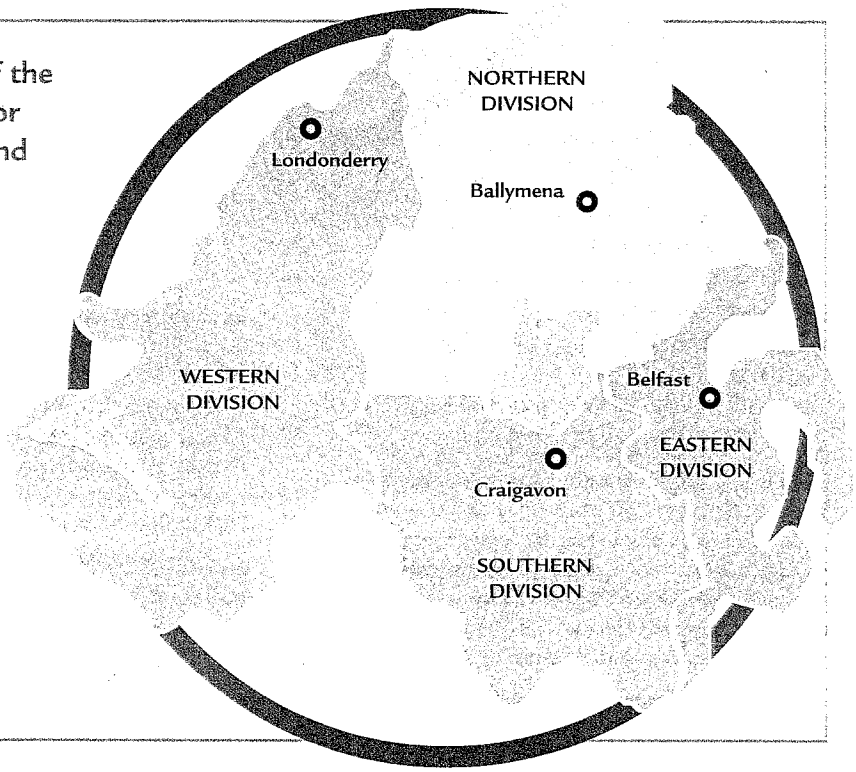
Water Service,
Department of the Environment for Northern Ireland,
3 Frederick Street, Belfast, BT1 2NR
Tel: 01232 244711• Fax: 01232 354888

The Water Service, which is responsible for delivery of water and sewerage services in Northern Ireland, was established as an Agency within the Department of the Environment for NI, on 1 April 1996. This has enabled it to operate as a business focused unit in the Department, within a framework of appropriate efficiency targets and performance measures, which will further develop the commercial orientation of the organisation. The provision of water and sewerage services in Northern Ireland is exercised under the Water & Sewerage Services (NI) Order 1973 (as amended).

The Water Service consists of a Head Office Group and four territorial operational Divisions, under the control of the Water Service Board. The Head Office Group, which is based in Belfast, is responsible for legislation, policy, planning, statistics, financial and manpower resources and control of the Capital Works Programme. The four territorial Divisions carry out the day-to-day operational functions of providing water and sewerage services to the domestic, industrial, commercial and agricultural sectors.

Water pollution control is a DoE (NI) function but is administered separately by the Department's Environment & Heritage Service. Statutory authority is provided by the Water (Northern Ireland) Act 1972 under which the Department's consent is required for discharges to inland and coastal waters from industry, sewage treatment works, fish farms and domestic septic tanks. Discharges are monitored regularly for compliance with consent standards. Under the Food and Environment Protection Act 1985, the Service also licenses the deposition of material at sea, for example, sewage sludge and harbour dredgings.

1.5 Department of the Environment for Northern Ireland Water Service



1.6 Area and resident connected population 1996/97

Water service companies	WATER SERVICES area km²	WATER SERVICES resident connected population 000s	SEWERAGE SERVICES area km²	SEWERAGE SERVICES resident connected population 000s
Anglian	22,000	3,990	27,500	5,282
Dŵr Cymru	20,400	2,788	21,300	2,943
Northumbrian	8,993	2,527	9,400	2,580
North West	14,415	6,856	14,445	6,791
Severn Trent	19,745	7,280	21,650	8,300
Southern	4,450	2,200	10,450	3,920
South West	10,300	1,516	10,800	1,394
Thames	8,019	7,381	13,302	11,635
Wessex	7,350	1,162	10,000	2,397
Yorkshire	13,900	4,463	13,600	4,738
TOTAL water service companies	**129,572**	**40,162**	**152,447**	**49,979**
Water supply companies				
Bournemouth and West Hampshire	1,041	415		
Bristol	2,391	1,039		
Cambridge	1,173	284		
Chester	142	108		
Cholderton	25	3		
Essex & Suffolk	2,850	1,677		
Folkestone and Dover	420	156		
Hartlepool	90	92		
Mid Kent	2,050	537		
Mid Southern	1,502	735		
North Surrey	500	473		
Portsmouth	868	646		
South East	2,105	625		
South Staffordshire	1,507	1,230		
Sutton & East Surrey	834	628		
Tendring Hundred	352	141		
Three Valleys	3,213	2,381		
Wrexham	700	150		
York	340	177		
TOTAL water supply companies	**22,104**	**11,496**		
TOTAL England and Wales	**151,676**	**51,658**	**152,447**	**49,979**
East Scotland	10,873[1]	1,496	10,600	1,403
North Scotland	46,575[1]	1,209	46,575	1,064
West Scotland	19,968[1]	2,432	20,241	2,367
Northern Ireland	14,150	1,634	14,150	1,384
TOTAL UK	**243,242**	**58,429**	**244,013**	**56,197**

[1] *Area includes inland waters*

Source: Water companies, Scottish Office, DoE (NI) Water Service.

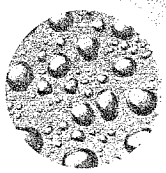
1.7 Number of connections 1996/97

	UNMEASURED SUPPLY				MEASURED SUPPLY			
	households		non-households		households		non-households	
	water 000s	sewerage 000s	water 000s	sewerage 000s	water 000s	sewerage 000s	water 000s	sewerage 000s
Water service companies								
Anglian	1,216	1,675	19	26	328	393	95	91
Dŵr Cymru	1,048	1,095	28	26	46	46	66	48
Northumbrian	975	1,013	25	27	19	17	44	36
North West	2,511	2,489	38	41	158	154	174	144
Severn Trent	2,554	2,895	50	67	290	290	170	165
Southern	766	1,414	18	30	107	151	50	67
South West	530	489	9	9	59	52	62	36
Thames	2,842	4,416	65	95	156	255	148	202
Wessex	389	838	11	25	51	80	42	51
Yorkshire	1,590	1,680	19	29	141	145	111	94
TOTAL	**14,421**	**18,004**	**282**	**375**	**1,355**	**1,583**	**962**	**934**
Water supply companies								
Bournemouth & West Hampshire	148		3		12		11	
Bristol	377		17		32		19	
Cambridge	85		2		16		8	
Chester	38		0		4		3	
Cholderton	n/a		n/a		n/a		n/a	
Essex and Suffolk	602		7		5		35	
Folkestone and Dover	52		2		10		3	
Hartlepool	36		1		0		1	
Mid Kent	181		3		19		19	
Mid Southern	236		2		26		14	
North Surrey	163		3		15		8	
Portsmouth	258		4		0		14	
South East	214		4		37		15	
South Staffordshire	446		11		28		20	
Sutton & East Surrey	229		4		11		12	
Tendring Hundred	52		1		8		3	
Three Valleys	859		13		56		42	
Wrexham	51		1		6		4	
York	69		2		0		3	
TOTAL Water supply cos.	**4,096**		**80**		**285**		**234**	
TOTAL England & Wales	**18,517**	**18,004**	**362**	**375**	**1,640**	**1,583**	**1,196**	**934**
East Scotland	671[1]*	568[1]	38[1]	44[1]	0	0	15	0
North Scotland	480[1]	451[1]	51[1]	51[1]	0	0	22	12
West Scotland	966[1]	977[1]	57[1]	72[1]	0	0	25	0
Northern Ireland	560	483	45	37	0	0	65	1
TOTAL UK	**19,078**	**20,483**	**406**	**579**	**1,640**	**1,583**	**1,323**	**947**

Note: These figures do not include connections that are void, eg, empty houses.
n/a = not available
[1]Data is for 1995/96
**Revised figure*

Source: Water companies, Scottish Office, DoE (NI) Water Service

Regulation of water services



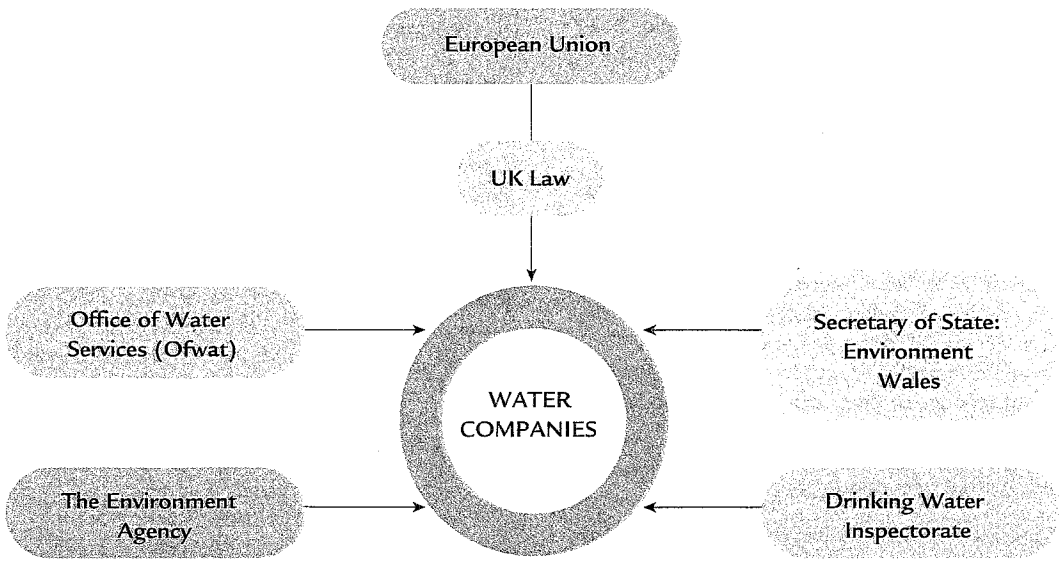
Public water and sewerage services in the United Kingdom are provided by undertakers from the public and private sectors. In England and Wales undertakers are appointed (licensed) water companies. In Scotland, three new public authorities were set up in April 1996; and in Northern Ireland, the Department of the Environment for Northern Ireland provides the services. Economic regulation is different in England and Wales from elsewhere because the companies are in the private sector.

Regulation of the water companies in England and Wales is undertaken mainly by three regulatory agencies: Ofwat covers economic regulation; the Drinking Water Inspectorate (DWI) covers the quality of drinking water; and the Environment Agency (EA) provides water resources and protects the quality of the natural environment. The Secretaries of State for the Environment and for Wales have a wider role in developing the policy and legislative framework, and making appointments.

Under the new arrangements in Scotland, responsibility for overseeing the operating performance, charging policy and service standards of the new Authorities is allocated to the Scottish Water and Sewerage Customers Council. The Scottish Office continues to oversee the water quality performance of the new Authorities, and a new body also set up in April 1996, the Scottish Environmental Protection Agency (replacing the old River Purification Boards), deals with environmental matters.

The rest of this chapter describes the regulatory system in England and Wales in more detail.

2.1 Current regulation in England and Wales – the key players



THE REGULATORS

SECRETARY OF STATE FOR THE ENVIRONMENT AND SECRETARY OF STATE FOR WALES

The main functions of the Secretaries of State under the Water Industry Act 1991, the Water Resources Act 1991 and the Environment Act 1995 are:

- appointing companies to act as water and sewerage undertakers, the Director General of Water Services and individuals to serve on the Environment Agency
- elaborating and supplementing the regulatory framework by means of subordinate legislation, for example, to establish standards of performance in relation to the supply of water and sewerage services, to determine standards of wholesomeness of water, to set out criteria for the classification of river quality and to impose requirements to take precautions against pollution
- approving various codes of practice including conservation and recreational duties, and the exercise of pipelaying powers
- enforcing certain statutory obligations imposed on water and sewerage undertakers, for example, by making enforcement orders and initiating the prosecution of any water undertaker which supplies water unfit for human consumption.

In respect of the Environment Agency, the Secretaries of State's main functions are:

- paying grant-in-aid and setting financial controls
- designating water protection zones and making drought orders
- approving charging schemes, charges for water abstraction licences and discharge consents
- appointing technical assessors of water quality
- applying, in exceptional circumstances, for a special administration order.

The Secretaries of State receive the reports of the Chief Inspector of the Drinking Water Inspectorate, Director General of Water Services and the Environment Agency and, in certain circumstances, can give directions to them and receive information from them related to their functions.

OFFICE OF WATER SERVICES (Ofwat)

The Director General of Water Services (the Director General) has a primary duty under the Water Industry Act to ensure that:

- water and sewerage functions are properly carried out throughout England and Wales
- undertakers are able (in particular, by securing a reasonable return on their capital) to finance their functions.

Subject to this primary duty, the Director General has a duty to customers to:

- ensure that no undue preference is shown and that there is no undue discrimination in the way companies fix and recover charges, and that rural customers are protected. This means that a customer's bill should, in general terms, reflect the costs which that customer imposes on the water and sewerage systems for a supply of clean water, disposal of dirty water and draining surface water
- ensure that other aspects of customers' interests are protected – including quality of service and benefits from the sale of land transferred to the companies at privatisation, or acquired since then
- promote economy and efficiency on the part of undertakers in the carrying out of water and sewerage functions
- facilitate effective competition between suppliers and potential suppliers and,
- determine certain kinds of disputes between companies and customers.

The Director General, Ian Byatt, was appointed in April 1989 for a period of five years. He has been reappointed until the end of July 2000. The Director General is supported by around 190 staff, the cost of which is recovered from appointees by a licence fee.

CUSTOMER SERVICE COMMITTEES (CSCs)

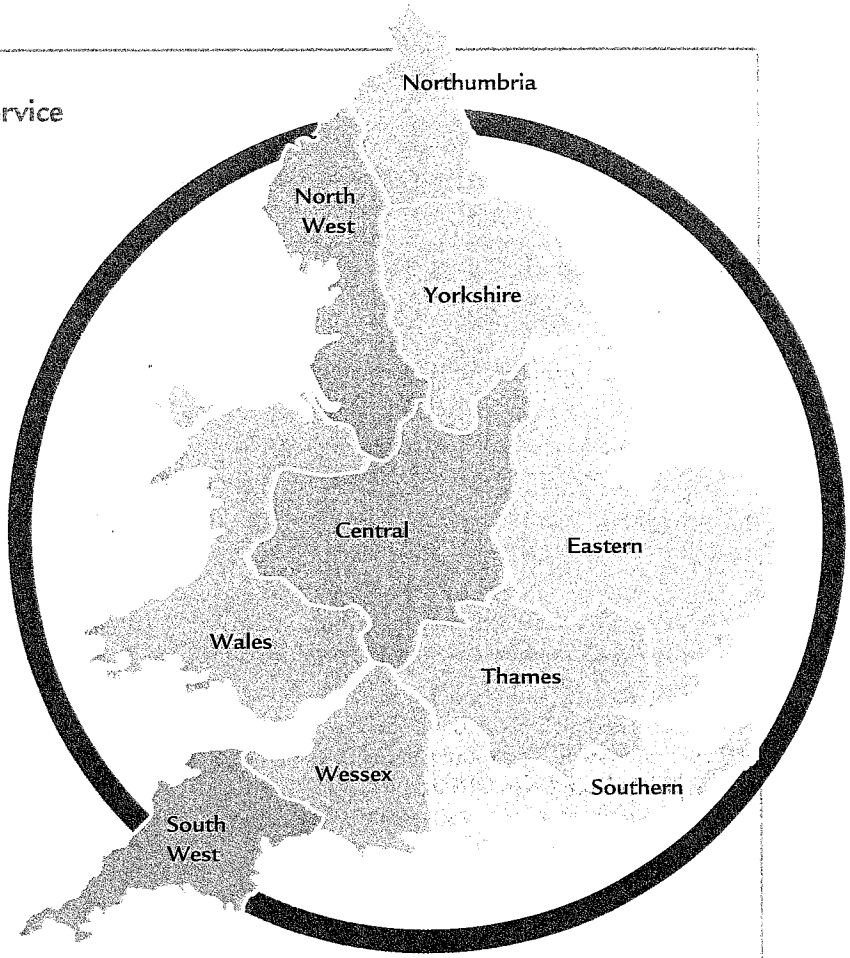
The prime responsibility for customers rests with the companies themselves. However, under the Water Industry Act, ten regional Ofwat Customer Service Committees (CSCs) were established by the Director. They represent the interests of customers and investigate customers' complaints.

There is one CSC for each region covering each of the water and sewerage companies and they are independent of the water companies. The Director appoints a chairperson for each (after consulting the Secretary of State for Trade and Industry or the Secretary of State for Wales) and between ten and 20 other members.

To represent customer interests at a national level, the chairmen of the CSCs form the Ofwat National Customer Council (ONCC). The ONCC and the CSCs advise and support the Director General in protecting the interests of customers.

Ofwat Customer Service Committees' addresses are given on map 2.2.

2.2 Ofwat Customer Service Committees (CSCs)



Office of Water Services
Central City Tower
7 Hill Street
Birmingham
B5 4UA

Tel: 0121 625 1300
Fax: 0121 625 1400

Central CSC
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1st Floor
Chanelle House
86 New Street
Birmingham B2 4BA

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Fax: 0121 644 5256

CSC for Wales
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Room 140
Caradog House
1-6 St Andrews Place
Cardiff CF1 3BE

Tel: 01222 239852
Fax: 01222 239847

Eastern CSC
Dr Roger Corbett
Ground Floor
Carlyle House
Carlyle Road
Cambridge CB4 3DN

Tel: 01223 323889
Fax: 01223 323930

Northumbria CSC
Mr Jim Gardner CVO, CBE, DL
2nd Floor
35 Nelson Street
Newcastle NE1 5AN

Tel: 0191 221 0646
Fax: 0191 221 0650

North West CSC
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Suite 902
9th Floor
Bridgewater House
Whitworth Street
Manchester M1 6LT

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Fax: 0161 228 6117

Southern CSC
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15-17 Ridgmount Street
London WC1E 7AH

Tel: 0171 636 3656
Fax: 0171 637 4813

South West CSC
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Exeter EX1 1TS

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Fax: 01392 428010

Thames CSC
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London WC1E 7AH

Tel: 0171 636 3656
Fax: 0171 636 3665

Wessex CSC
Ms Shelia Reiter
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St Philips
Bristol BS2 0BH

Tel: 0117 955 7001
Fax: 0117 955 7037

Yorkshire CSC
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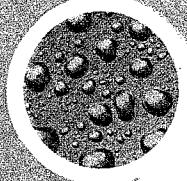
Leeds LS2 8DD

Tel: 0113 234 0874
Fax: 0113 234 1316



DRINKING WATER INSPECTORATE (DWI)

The Inspectorate was formed in January 1990 and now has a complement of 29 posts of which 17 are professionally qualified staff. Its main role is to check on behalf of the Secretaries of State that the water companies of England and Wales are fulfilling their obligations with regard to the quality of drinking water supplies. The main tasks of the Inspectorate are to:

- carry out the technical audit and inspection of water companies
- initiate action as necessary to secure or facilitate compliance with legal requirements
- investigate incidents which adversely affect drinking water quality
- advise the relevant Secretary of State on prosecution of water companies if water has been supplied which is unfit for human consumption
- provide technical and scientific advice to Ministers and officials of the Department of the Environment, Transport and the Regions (DETR) and the Welsh Office on drinking water policy matters including the water byelaws
- assess and respond to consumer complaints when local procedures have been exhausted
- identify and assess new issues or hazards relating to drinking water quality and initiate research as required
- assess chemicals and materials used in connection with water supplies
- represent the DETR in standardisation work, particularly that related to the European Union.

The Inspectorate initiates enforcement action, on behalf of the relevant Secretary of State, in the following circumstances:

- when a water quality standard set under Regulation 3 of the Water Supply (Water Quality) Regulations 1989 is breached and the breach is not trivial and is likely to recur
- when a breach of one of the other enforceable regulations, such as those covering sampling or analysis, is identified
- when existing Section 19 undertakings, or time limited relaxations authorised under Regulation 4, expire before the required improvements have been completed.

The Inspectorate will not initiate enforcement action when a company, after becoming aware of a breach of regulatory requirement, takes immediate remedial action and demonstrates that compliance has been achieved.

ENVIRONMENT AGENCY

The Agency is a non-departmental public body. It came into being following Royal Assent of the 1995 Environment Act, and appointment of the Board, in August 1995. Formation came from the amalgamation of the National Rivers Authority (NRA), Her Majesty's Inspectorate of Pollution (HMIP), 83 Waste Regulation Authorities (WRAs), and parts of the Department of the Environment. The Agency took up statutory duties to protect and improve the environment across England and Wales at vesting on 1 April 1996 with principal functions of pollution prevention and control (environmental protection), water resources, flood defence, fisheries, recreation, conservation and navigation. The Environmental Protection Directorate includes integrated pollution control, radioactive substances, waste regulation and water quality functions. Pollution control and fisheries responsibilities extend out to three and six nautical miles from the coast respectively.

STATUTORY RESPONSIBILITIES

The Agency has a wide range of statutory duties and powers related to its core functions. Many of these are relatively unchanged from those carried out by the NRA, HMIP and WRAs. However the 1995 Environment Act consolidated and amended inherited duties and added some new ones. New responsibilities include assessing and reporting on the state of pollution of the environment, advising on and implementing the National Air Quality and Waste Strategies, advising on the remediation of contaminated land and abandoned mines, conservation of nature and heritage, producer responsibility for waste, and a general duty to take account of likely costs and benefits in the exercise of its powers.

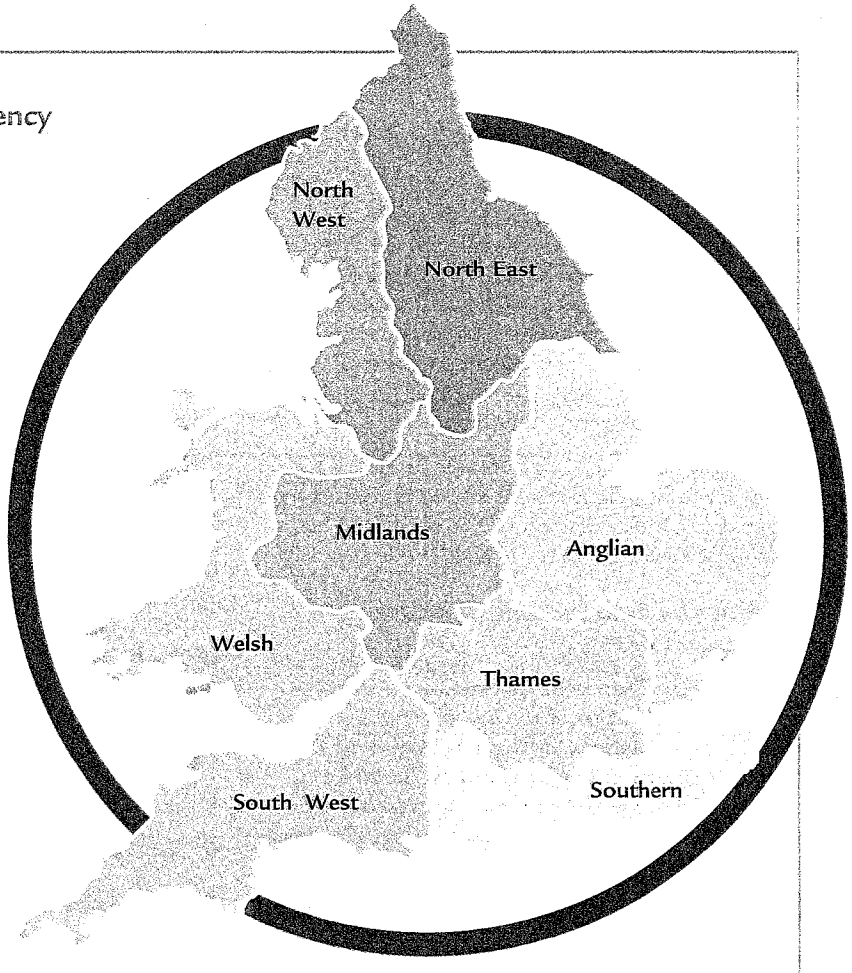
PRINCIPAL AIM

The Agency's principal aim, as defined in Section 4 of the Environment Act 1995, is:

"In discharging its functions so to protect or enhance the environment, taken as a whole, as to make the contribution towards attaining the objective of achieving sustainable development that Ministers consider appropriate".

This principal aim is subject to the other provisions of the Act and any other enactment under which the Agency will operate, and to the requirement that the Agency take into account likely costs – including costs to the environment.

2.3 Environment Agency Regional Offices



Head Office: Bristol
Rio House
Waterside Drive
Aztec West
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Tel: 01454 624400
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Midlands
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Solihull
West Midlands
B91 1QT

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Fax: 0121 711 5824

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Leeds LS1 2QG

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Fax: 0113 246 1889

North West
Richard Fairclough House
Knutsford Road
Warrington
WA4 1HG

Tel: 01925 653999
Fax: 01925 415961

Southern
Guildbourne House
Chatsworth Road
Worthing
West Sussex
BN11 1LD

Tel: 01903 832000
Fax: 01903 821832

South West
Manley House
Kestrel Way
Exeter EX2 7LQ

Tel: 01392 444000
Fax: 01392 444238

Thames
Kings Meadow House
Kings Meadow Road
Reading RG1 8DQ

Tel: 0118 953 5000
Fax: 0118 950 0388

Welsh
Rivers House
Plas-yr-Afon
St Mellons Business Park
Cardiff CF3 0LT

Tel: 01222 770088
Fax: 01222 798555

ENVIRONMENT AGENCY continued...

ORGANISATION AND MANAGEMENT STRUCTURE

It has a Board of 15 members, appointed by the Secretary of State for the Environment, the Secretary of State for Wales and the Minister of Agriculture, Fisheries and Food. There is a special statutory Advisory Committee appointed by the Secretary of State for Wales. The Board is accountable to Ministers for formulating and delivering the Agency's policies with regularity, probity and propriety.

The Agency has Head Offices located in Bristol and operates through eight regions and 26 areas across England and Wales. It employs 9,563 staff and has funding of £581 million for 1997/98.

MINISTRY OF AGRICULTURE, FISHERIES AND FOOD (MAFF)

The Minister of Agriculture, Fisheries and Food appoints two members of the EA. This reflects MAFF's responsibilities for flood defence and fisheries matters in England. Together with the Secretary of State for Wales, the Minister has a general oversight of flood defence and fisheries and may give directions as to how they are carried out. Day-to-day responsibility for these functions rest with the EA but byelaws, orders, schemes, etc. will continue to be confirmed by the appropriate Minister. The Minister appoints the chairmen and a number of members of the regional flood defence committees. The Minister also licenses, monitors and controls the deposit of any substances, including sewage sludge, in the sea as set out in the Food and Environment Protection Act 1985 Part II.

MONOPOLIES AND MERGERS COMMISSION (MMC)

The principal role of the MMC is very much that of a 'court of appeal' both for the Director General and for the water companies. A company may appeal to the MMC against the Director General's decision in the event that a company is dissatisfied with:

- the Director General's determination in a Periodic Review of 'K'
- the Director General's interim adjustments to 'K' between Periodic Reviews
- any proposed amendment by the Director General to the Instrument of Appointment.

This appeal procedure acts as a counter-balance to the considerable power of the Director General. In the event of any proposed merger between water companies and where both companies hold assets valued in excess of £30 million, there will be an automatic referral to the MMC.

THE OFFICE OF FAIR TRADING (OFT)

The Office of Fair Trading is the senior governmental regulatory agency. The Director General of Fair Trading (DGFT) exercises powers under the Fair Trading Act 1973, Competition Act 1980 and the Competition and Service (Utilities) Act 1992. The Water Act 1991 contains provision for the DGFT to request the DG to exercise certain of the DGFT's functions under the Fair Trading Act relating to courses of conduct which are or may be detrimental to customers of the water and sewerage undertakers. Certain of the DGFT functions under the Fair Trading Act and the Competition Act may be exercised by both the DGFT and the DG in so far as they relate to water and sewerage services. The DG also has a duty to give information, advice and assistance to the DGFT in relation to the functions of the water and sewerage undertakers.

LEGISLATION

The Water Act 1989 was almost entirely replaced by the following Consolidation Acts which came into force on 1 December 1991:

- the Water Industry Act 1991
- the Water Resources Act 1991
- the Statutory Water Companies Act 1991
- the Land Drainage Act 1991
- the Water Consolidation (Consequential Provisions) Act 1991.

These have been subsequently amended, in particular by the Competition and Service (Utilities) Act 1992 and the Environment Act 1995.

CODES OF PRACTICE

There are three statutory codes of practice as follows:

- code of practice with respect to environmental and recreational duties
- code of good agricultural practice
- code of practice with respect to the exercise by water companies of their works powers on private land.

The Licence of Appointment requires each company to produce codes of practice on the following under conditions G, H and I respectively:

- customer relations with the CSCs
- disconnections
- leakage.

The industry has also developed other voluntary codes of practice such as doorstep collection.

There is also for each company a guaranteed standards scheme laid down in statutory instruments 1159 and 1383 of 1989, and 500 of 1993. Under the scheme customers are entitled to a payment or credit when a company fails to maintain certain minimum standards of service to domestic premises.

2.4 Regulators' costs 1996/97

	expenditure £m	investment £m	manpower March 1997
Ofwat	9.6	n/a	190
EA			
Flood protection	287.1	27.0	2,930
Water resources	79.4	9.8	770
Pollution control	168.3	13.1	3,142
Other	46.4	3.4	2,281
TOTAL EA	**581.2**	**53.3**	**9,123**
DWI	1.7	n/a	31

n/a = not applicable

Source: Regulators

Ofwat's costs are entirely covered by licence fees levied on companies. The Environment Agency is financed primarily from charges and levies (approximately 70%) but also from central government grants (approximately 30%). The DWI is funded through the DETR's administration vote.

OUTPUT MONITORING AND PERFORMANCE INDICATORS

The Director General of Water Services has a statutory duty to ensure that companies properly carry out their functions. Ofwat's approach to this is to monitor output performance, not just levels of service to customers but also environmental performance. The price cap regime operates on a medium-term basis and between price reviews, companies have an incentive to improve efficiency while still delivering the required outputs.

The attached table provides a selection of summary indicators of industry performance. These overlap with, but are not identical to, those used by Ofwat to monitor performance on an annual basis. More detail on the DG indicators used in the table can be found in Ofwat publications.

2.5 Company performance 1990/91 to 1995/96

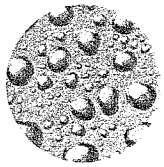
Indicator description	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96
Water quality						
% of samples compliant with PCVs	99.0	98.7	98.7	98.9	99.3	99.5
Water supply						
% Properties at risk of low pressure (DG2)	1.85	1.69	1.26	1.02	0.81	0.75
% Properties subject to unplanned supply interruptions of 12 hours or more (DG3)	0.42	0.20	0.38	0.35	0.26	0.58
Water resources						
% Population subject to hosepipe bans (DG4)	41	14	9	0	3	39
Number of drought orders	61	28	16	0	0	53
Sewerage service						
% Properties at risk of sewer flooding (DG5)	0.13	0.11	0.09	0.08	0.09	0.07
% Total properties affected by flooding	0.03	0.02	0.05	0.05	0.03	0.02
Environmental quality						
% STWs compliant with discharge consents	90	94	95	94	96	97
% Bathing waters compliant with EC standards	78	75	79	79	83	89
Rivers and canals graded "good" or "fair"	85 (1988-90)	–	–	–	–	90 (1994-96)
Customer service						
% Billing queries not responded to within 5 working days (DG6)	31	30	20	16	11	10
% Written complaints not responded to within 10 working days (DG7)	31	26	18	24	5	6
Disconnection rate (per 10,000 connections) – households	4	11	10	7	5	3
Disconnection rate (per 10,000 connections) – non-households	9	14	19	16	17	12
Unit costs (1995/96 prices)						
Water delivered (pence per cubic metre)	n/a	55	59	62	62	59
Sewage collected (pence per cubic metre)	n/a	n/a	74	79	80	81

n/a = not available

Note: the DG1 indicator measuring the risk of water shortage is now regarded as misleading and has been withdrawn.

Note: Some revisions have been made to figures from previous years.

Water supply



The wet winter of 1994/95 and following spring ensured that water resources, both groundwater and surface water, were plentiful prior to the summer of 1995. However, an unprecedented dry period with exceptionally hot weather put severe strains on distribution systems throughout the country. In some regions, record peak daily supplies were recorded. Subsequently, localised water resource problems were experienced during the summer of 1995. The dry weather continued through 1996 and 1997 with well below average replenishment of water stocks in many regions over the 1995/96 and 1996/97 winter periods.

3.1 Total annual rainfall (mm)

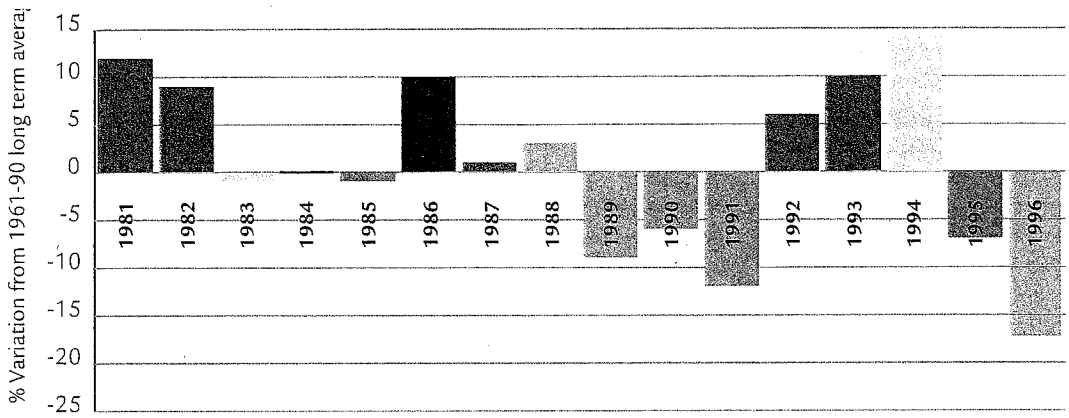
EA Region	1961-90 average	1989	1990	1991	1992	1993	1994	1995	1996
Anglian	596	541	472	470	705	728	646	542	470
Northumbria	853	607	865	806	847	965	881	815	714
North West	1,201	1,074	1,256	1,111	1,238	1,165	1,359	1,015	933
Severn Trent	754	727	687	645	848	836	859	676	620
Southern	778	667	699	703	801	907	946	764	647
South West	1,173	1,121	1,175	1,092	1,126	1,386	1,474	1,178	1,125
Thames	688	645	553	602	795	772	744	687	533
Welsh	1,313	1,282	1,301	1,219	1,390	1,370	1,563	1,208	1,146
Wessex	839	810	742	766	849	964	1,035	930	779
Yorkshire	821	665	777	674	837	895	887	690	691
England & Wales	**895**	**816**	**838**	**790**	**949**	**983**	**1,023**	**830**	**747**
Scotland	**1,436**	**1,497**	**1,918**	**1,469**	**1,735**	**1,488**	**1,615**	**1,496**	**1,267**
Northern Ireland	**1,035**	**934**	**-**	**879**	**1,029**	**1,004**	**966**	**905**	**897**

Note: to allow better spacial differentiation, rainfall data are presented for the old regional divisions of the NRA - precursor of the EA. These regions differ slightly from water service company regions.
Note: subsquently Northumbria and Yorkshire have merged to become North East, South West and Wessex have merged to become South West, and Severn Trent has become Midlands.

Source: Digest of Environmental Statistics DETR 1997, Institute of Hydrology using Meteorological Office data, DoE (NI) Water Service.

Although rainfall in 1995 was only about 8% below the long-term average, the sustained period of dry weather that started in the summer of 1995 continued through to the summer of 1996. Although flows in many rivers fell well below seasonal averages, reservoir stocks in 1996 were more healthy than in 1995. However, the continued lack of rainfall meant that groundwater levels in some parts of the south and east fell below the lowest level ever recorded. Over many regions the winter rainfall of 1996/97 was well below average and replenishment of many lowland reservoirs was also below average. Groundwater levels remained depressed. The 24 month period from April 1995 to March 1997 was in many regions of the south and east the driest on record.

3.2 Rainfall for England and Wales 1981 to 1996



Source: Digest of Environmental Statistics, DETR 1997

3.3 Drought Orders

EA region	1976	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96
Anglian	15	0	0	0	0	0	0	0	0	0	0	0	0	1	3	0	0	0	0	0	0
North East	18	0	0	0	0	0	0	0	0	0	0	0	0	9	17	9	1	0	0	21	18
North West	0	0	2	0	2	0	6	0	31	0	0	0	0	21	0	1	0	0	0	23	12
Midlands	13	0	0	0	0	0	0	0	6	0	0	0	0	5	0	0	0	0	0	1	2
Southern	4	0	0	0	0	0	0	0	0	0	0	0	0	19	25	18	11	0	0	1	5
South West	58	0	15	0	0	0	7	5	45	0	0	0	0	21	13	0	1	0	0	7	5
Thames	8	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	3	0	0	0	0
Welsh	20	0	2	0	2	0	2	1	22	0	0	0	0	13	1	0	0	0	0	0	2
TOTAL	**136**	**0**	**19**	**0**	**4**	**0**	**15**	**6**	**104**	**0**	**0**	**0**	**0**	**89**	**61**	**28**	**16**	**0**	**0**	**53**	**44**

Note: EA regions, previously NRA regions, differ slightly from water service company regions.

Source: Digest of Environmental Statistics DETR 1997, Welsh Office

This information comes from the Department of the Environment, Transport and the Regions and includes all drought orders, ie both orders that restrict the taking of water from the environment and orders that restrict non-essential uses by end-users.

The number of drought orders issued generally reflects a drought's severity. In 1976, the drought was very much countrywide whereas in 1984, western Britain was worst hit. The protracted drought of 1988-92 started as a surface water drought (hence many reservoir-dependent companies had drought orders) but as it progressed, it became a groundwater drought, involving Southern, Anglian, Thames and Yorkshire regions in the east and south of the country.

Although there has been a severe shortage of rainfall since April 1995, drought orders and restrictions have been minimal.

3.4 Estimated water abstractions (million litres/day) 1995

EA region	Public water supply surface	Public water supply ground	Private water supply surface	Private water supply ground	Industry surface	Industry ground	Mineral washing surface	Mineral washing ground	Spray irrigation surface	Spray irrigation ground
Anglian	1,088	784	0	25	62	156	10	72	85	63
North East	2,373	387	1	10	219	108	12	0	12	25
North West	1,442	241	0	0	383	97	5	26	4	2
Midlands	1,644	1,080	2	4	323	93	13	40	56	40
Southern	271	1,057	0	1	47	124	0	18	17	10
South Western	903	447	19	5	105	31	2	2	7	4
Thames	2,665	1,378	0	29	25	56	0	59	6	9
Welsh	1,452	134	1	1	466	30	1	1	9	2
England & Wales	**11,838**	**5,508**	**23**	**75**	**1,630**	**695**	**43**	**218**	**196**	**155**

EA region	Agriculture* surface	Agriculture* ground	Fish farming surface	Fish farming ground	Electricity supply surface	Electricity supply ground	Other surface	Other ground	TOTAL surface	TOTAL ground
Anglian	1	19	43	3	10	0	10	1	1,309	1,123
North East	0	11	434	3	671	6	28	25	3,750	575
North West	0	5	159	3	414	0	0	1	2,407	375
Midlands	1	4	69	5	1,479	9	0	0	3,587	1,275
Southern	0	3	1,091	166	24	0	0	0	1,450	1,379
South Western	14	32	1,480	140	1,228	1	7	58	3,765	720
Thames	0	6	315	54	79	0	0	0	3,090	1,591
Welsh	0	7	301	2	4,301	2	90	0	6,621	179
England & Wales	**16**	**87**	**3,892**	**376**	**8,206**	**18**	**135**	**85**	**25,979**	**7,217**

**Excludes spray irrigation*

Note: EA regions, previously NRA regions, differ slightly from Water Service Company regions.

Source: Digest of Environmental Statistics DETR 1997

The Environment Agency has responsibility for licensing under the Water Resources Act 1991, hence table 3.4 presents data for each of the Agency's regions and divided into nine usage categories. The WSCs and water supply companies abstract raw water from rivers, reservoirs and lakes (the surface sources) and also from wells and boreholes (the underground sources) prior to treating to achieve the potable standards required for public supply. Some industries which require water that is clean, but not treated to drinking water standards, receive non-potable supplies.

3.5 Public water supplied in 1973/74 to 1996/97 (million litres/day)

	England & Wales [1]						
	unmetered	metered	non-potable	TOTAL [2]	Scotland	Northern Ireland	TOTAL UK [2]
1973/74	9,343	4,884	579	14,806			
1974/75	9,555	4,801	548	14,904			
1975/76	9,907	4,668	534	15,109			
1976/77	9,519	4,359	539	14,417			
1977/78	9,961	4,211	552	14,724			
1978/79	10,407	4,352	584	15,343			
1979/80	10,961	4,490	643	16,094			
1980/81	11,083	4,247	546	15,876			
1981/82	11,224	4,029	561	15,814			
1982/83	11,548	4,106	561	16,215			
1983/84	11,842	3,996	516	16,354	2,236	691	19,281
1984/85	11,956	3,990	558	16,504	2,199	682	19,385
1985/86	12,036	3,965	575	16,576	2,198	678	19,452
1986/87	12,195	4,088	571	16,854	2,243	679	19,776
1987/88	12,216	4,059	604	16,879	2,194	680	19,753
1988/89	12,177	4,114	605	16,896	2,205	679	19,780
1989/90	12,424	4,135	714	17,273	2,248	674	20,195
1990/91	12,549	4,256	576	17,381	2,300	680	20,361
1991/92	12,399	4,258	552	17,209	2,239	680	20,128
1992/93	11,551	4,417	503	16,471	2,206	670	19,347
1993/94	11,999	4,034	521	16,554	2,272	670	19,496
1994/95	12,350	4,139	526	17,015	2,263	680	19,958
1995/96	12,644	4,384	293	17,321	2,247	703	20,271
1996/97	11,917	4,446	295	16,657	2,321	706	19,684

Note: Data for public water supply for 1961 to 1985/86 was given in Waterfacts '86.

Note: Some revisions have been made to figures from previous years.

[1] *Includes water supply companies.*

[2] *Totals may not add due to rounding.*

Source: Water companies, Scottish Office, DoE (NI) Water Service

The total supplied in 1996/97 has reduced as a result of water conservation and leakage reduction efforts by the industry and its customers.

3.6 Public water supplied in 1996/97 (Ml/d)

	unmeasured[1] potable	measured potable	non-potable	TOTAL[2]
Water service companies				
Anglian	732	447	38	**1,217**
Dŵr Cymru	788	243	141	**1,172**
Northumbrian	572	227	0	**799**
North West	1,582	594	83	**2,259**
Severn Trent	1,429	593	0	**2,022**
Southern	439	183	9	**631**
South West	347	131	0	**478**
Thames	2,252	606	0	**2,858**
Wessex	294	133	0	**427**
Yorkshire	978	373	0	**1,351**
TOTAL water service companies	**9,413**	**3,530**	**271**	**13,214**
Water supply companies				
Bournemouth and West Hampshire	94	69	8	**171**
Bristol	239	86	12	**337**
Cambridge	50	24	0	**74**
Chester	21	8	0	**28**
Cholderton	n/a	n/a	n/a	**n/a**
Essex & Suffolk	338	160	0	**498**
Folkestone and Dover	34	17	0	**51**
Hartlepool	20	16	3	**39**
Mid Kent	119	48	0	**166**
Mid Southern	166	57	0	**223**
North Surrey	98	39	0	**137**
Portsmouth	135	48	0	**183**
South East	126	46	0	**173**
South Staffordshire	272	81	0	**353**
Sutton & East Surrey	130	32	0	**162**
Tendring Hundred	25	9	0	**34**
Three Valleys	575	147	0	**722**
Wrexham	28	16	1	**45**
York	35	11	0	**46**
TOTAL water supply companies	**2,504**	**916**	**24**	**3,444**
TOTAL England & Wales	**11,917**	**4,446**	**295**	**16,657**
East Scotland[3]	522	217	1	**739**
North Scotland[3]	321	105	6	**432**
West Scotland[3]	905	235	10	**1,150**
Northern Ireland	519	187	0	**706**
TOTAL UK	**14,184**	**5,190**	**311**	**19,685**

n/a = not available

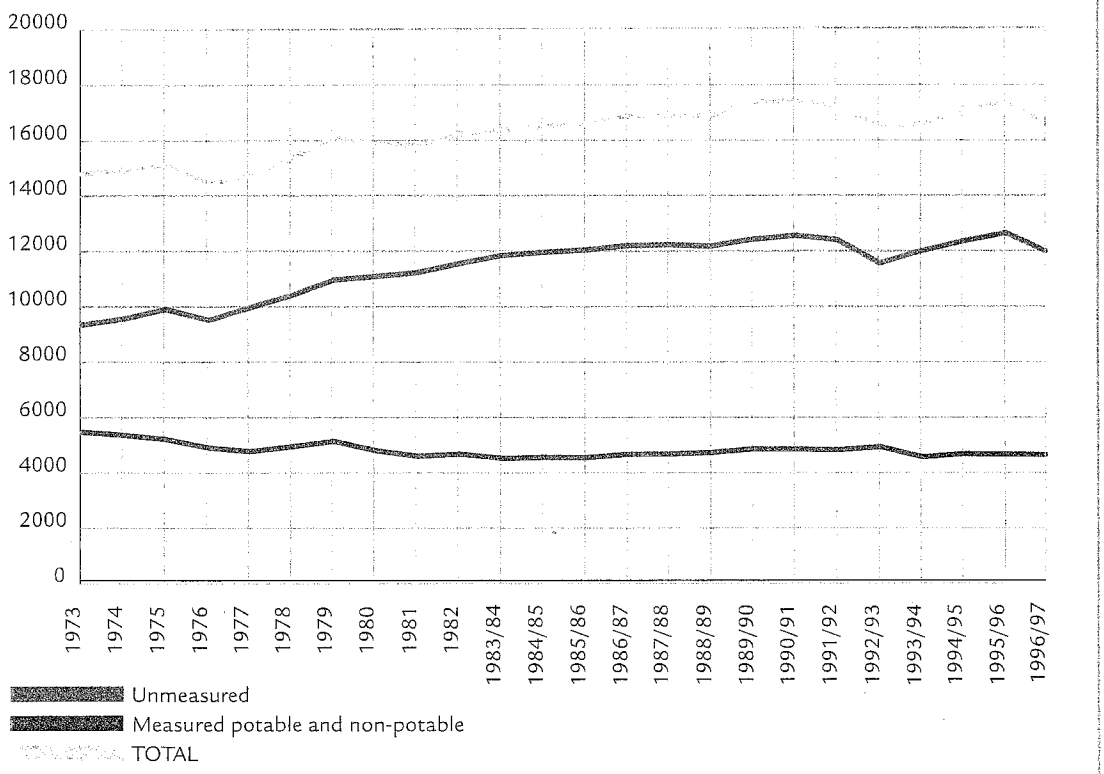
[1] Unmeasured water includes water delivered to unmeasured properties (including supply pipe losses) as well as distribution losses, operational uses (eg. mains flushing) and the miscellaneous water taken (including fire fighting)

[2] Totals may not add due to rounding.

[3] Data supplied is for 1995/96 and has been revised.

Source: Water companies, Scottish Office, DoE (NI) Water Service

3.7 Public water supplied 1973 to 1996/97 in England and Wales (Ml/d)



TREATMENT OF DRINKING WATER

The extent of treatment required depends on the nature of the water coming into the water treatment works (WTWs). Water from springs for example only requires disinfection, because it is usually already very clean having been filtered naturally. Water from reservoirs or from rivers normally requires more extensive treatment.

Water treatment processes include:

Screening – the water passes through a coarse mesh to remove leaves and other debris.

Coagulation – small particles in the water which are too small to be removed by the screens are "coagulated" using an approved chemical to bind them into larger particles.

Clarification – the coagulated particles are then separated from the clarified water to form sludge which is removed for disposal.

Filtration – the clarified water now passes through sand and gravel which takes out any remaining particles. These filters are washed regularly. The water is now completely clean and colourless.

pH correction – if the pH value is too low, lime is added to adjust the pH value (the measure of acidity) to improve the water's physico-chemical properties.

Phosphate dosing – where appropriate, phosphate is added to minimise plumbosolvency of customers' lead pipes.

Final disinfection – the water is disinfected, usually with chlorine, to make sure it is of high quality to drink.

Storage – fully treated water then leaves the WTW and is piped to covered local storage reservoirs from which it is then piped to households and businesses.

3.8 Average household water use

Some examples of the amount of water used in everyday activities in the household are:

Taking a bath	up to 80 litres
Taking a shower	up to 35 litres
Flushing the toilet	up to 10 litres
Watering the garden using a sprinkler	up to 1,020 litres/hour
Using a washing machine	up to 80 litres
Using a dishwasher	up to 35 litres
Drinking and cooking use	up to 10 litres/day

In 1961 domestic consumption was 85 litres per head per day. In 1997 domestic consumption is 160 litres per head per day

LEAKAGE AND DISTRIBUTION

Leakage control is a vital component of the water industry's approach to the future management of water resources.

No water system in the world is leak proof. Leakage occurs not just from big bursts, which are generally obvious and relatively easily rectified. Pipes also leak from millions of joints throughout the distribution system, the greater part of which is much less readily accessible.

Water is a relatively cheap commodity. The economic merits of reducing the amount of water leaking from the pipes depends on how readily available that water is in the first place. Is it in short or prolific supply? Are there significant environmental considerations involved in the way in which it is extracted, stored or distributed?

In a country in which over 90% of domestic water customers are not metered, it is difficult to estimate leakage accurately. Although the technology and expertise for measuring leakage has greatly advanced in recent years there is still a fair degree of improvisation in the exercise.

There are many different ways of measuring leakage. They all have their merits and drawbacks, none is perfect.

In the past leakage has been expressed as a percentage of the volume of water put into distribution. This can be misleading as a change in demand can change the percentage figure. International comparisons will also be misleading for the same reason. Per capita consumption is relatively low in the UK compared to other developed countries and thus leakage expressed as a percentage may appear high.

Litres per property per day and cubic metres per kilometre of mains per day relate leakage to specific dimensions of the water infrastructure and are thus useful ratios to provide comparisons.

As leakage is reduced, the cost of further reduction increases. For each company there will be an 'economic level of leakage', beyond which the value of water saved will be less than the cost of saving it. This economic level of leakage will vary from company to company according to local circumstances. The calculation will relate the cost of leakage control to the marginal cost of water, including factors such as the value of delaying additional resource development. The industry is developing a methodology for calculating the economic level of leakage and continues to sponsor research on this issue.

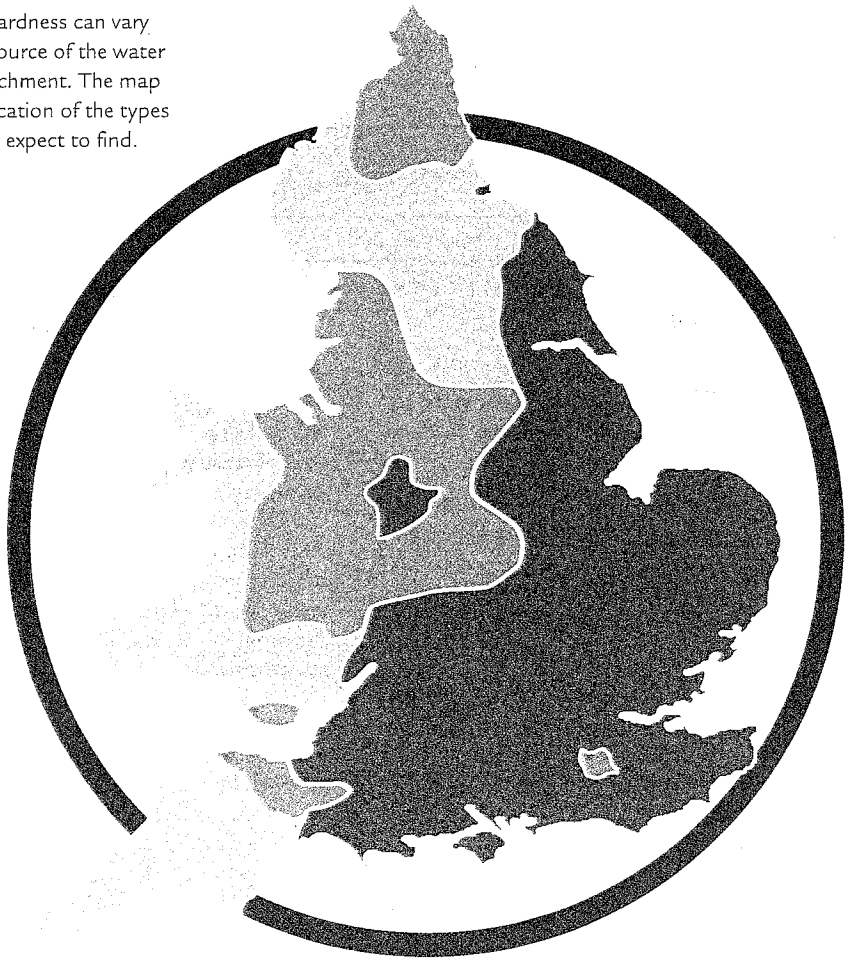
Ofwat publish annually a report on the cost of water delivered and sewage collected based on data supplied by companies in their July Returns. This systematic collection of data is unique to England and Wales and leakage comparisons with other countries, where the regulatory framework is less stringent, need to be treated with caution. Similarly, comparisons with data for past years, where the method of calculation was different, can be misleading. Ofwat regard the 1992/93 return as the base year from which year-on-year comparisons can be made.

In October 1995, the water and sewerage companies of England and Wales committed themselves to the biggest reduction of leakage in the history of the industry - seeking to achieve the lowest possible levels that best practice suggests are both technically feasible and economically sensible.

These voluntary targets were however superseded by mandatory targets set in the autumn of 1997 by OFWAT. The intention to set mandatory targets, which apply to the water service companies and the water only companies, was originally announced by the new Government at a Water Summit in May 1997 and they form part of a ten point plan designed to promote a more efficient use of water resources.

3.9 Water hardness

Rainwater is naturally 'soft'. As it percolates through the ground it can become 'hard' if it dissolves chalk and limestone. Water hardness can vary locally due to the source of the water and the type of catchment. The map gives a general indication of the types of water you would expect to find.



soft to moderately soft

slightly hard to moderately hard

hard to very hard

Source: British Effluent and Water Association booklet 'Water Softeners – a consumer's guide'
Copyright British Water

3.10 Drinking water quality compliance 1990-1996

Percentage of zones complying at all times with prescribed concentrations or values

Parameter	Percentage of zones complying in: 1990	1991	1992	1993	1994	1995	1996
Coliforms	90.9	94.8	96.7	98.9	99.5	99.4	98.8
Faecal Coliforms	87.6	89.3	90.0	93.6	95.1	95.8	96.2
Colour	98.4	98.6	99.1	99.3	99.4	99.8	99.9
Turbidity	94.6	94.3	95.2	96.1	96.4	96.4	96.1
Odour	96.8	98.0	99.0	99.3	99.3	99.1	97.1
Taste	96.8	97.8	98.5	98.9	98.7	99.1	99.5
Hydrogen ion	91.8	92.4	93.3	94.3	96.1	97.1	98.3
Nitrate	96.9	96.4	96.4	98.0	98.2	98.9	99.5
Nitrite	88.0	87.7	89.7	90.5	90.2	89.8	91.3
Aluminium	89.8	91.3	93.7	94.6	97.1	96.3	97.2
Iron	70.4	69.0	69.1	74.0	75.9	75.2	76.1
Manganese	90.3	89.6	91.6	93.1	94.3	91.7	91.8
Lead	76.6	74.4	78.9	79.1	80.2	81.3	86.9
PAH	96.0	93.2	91.4	89.9	88.0	87.3	86.6
Trihalomethanes	96.7	95.1	94.8	95.5	97.7	99.4	99.7
Total pesticides	-	85.4	86.7	88.1	89.1	91.2	97.5
Individual pesticides	70.2	69.4	70.2	72.1	76.3	79.2	87.0
Other parameters	-	93.9	94.9	97.2	98.1	98.2	97.7

Source: Drinking Water 1996: A report by the Chief Drinking Water Inspector

DRINKING WATER QUALITY IN ENGLAND AND WALES

The quality of drinking water in England and Wales is comprehensively audited and reported each year in the Chief Drinking Water Inspector's annual report. The report details the performance of each individual water company against European and British standards. In addition, all compliance data are available on the public records kept by the water companies.

The duty placed on water companies to supply wholesome water is extremely demanding. To fulfil their duty, companies must meet quality standards at all times. In 1996 the water companies carried out over 3 million tests at treatment works, service reservoirs and in water supply zones. About 80% of these tests were made on samples taken from consumers' taps. 99.7% of tests complied with the standards. This result confirms that the overall quality of drinking water in England and Wales is extremely high.

Each of the 0.3% of total tests that contravened the standard was assessed by the Inspectorate and there was no evidence that any of these contraventions in any way endangered the health of consumers. Only some of the parameters are of health significance and these standards are set with wide margins of safety. However no matter how trivial a breach of the regulation may be, it will appear on the record.

Each water company shows a similar high level of general compliance although the distribution of parameters will differ. The table above summarises the most significant parameters for England and Wales. Full details for all the companies are shown in the Chief Inspector's report.

3.11 Drinking water quality standards

Parameters tested in the UK [1]	What it means	amount allowed
Temperature	The standards require water to be supplied below a certain temperature.	25°C
pH	This is the measure of the acidity or alkalinity of water.	5.5 – 9.5
Colour	This is an aesthetic requirement – water should be clear and bright, but may occasionally show a slight reddish or yellowish tint caused by iron from iron mains. This is not harmful to health. There are major programmes under way to replace or reline old mains.	20 Hazen units on colour scale
Turbidity	Sometimes water appears milky because of air bubbles. This is not harmful and if the water is left to stand for a few minutes it will clear from the bottom upwards.	4 Formazin turbidity units
Total dried solids	Water samples are dried, so that water companies can weigh any residual substances such as minerals.	1500 mg/l
Qualitative odour	Water may smell of chlorine as a small amount of chlorine is added to water before it leaves the treatment works to ensure that the water remains safe on its journey to taps. It is not harmful to health.	Samples are frequently checked and any significant odour is investigated.
Qualitative taste	If water has been standing in pipework for some hours it may have a flat or metallic taste. It may help to flush the tap before taking water for drinking.	Samples are frequently checked and any significant taste is investigated.
Dilution odour Dilution taste	These are quality control tests to measure the level of odour and taste and are carried out by specialist tasting panels.	Dilution number 3 at 25°C
Conductivity	By passing an electric current through water, water companies can measure levels of mineral salts it contains.	1500µS/cm at 20°C
Total hardness	Hardness is usually caused by the rocks through which the water passes eg chalk. Hardness means you may use more soap when washing and hard water lathers less than soft water. It has no adverse effects on health – indeed, research has shown that in hard water areas there is less incidence of heart disease.	Standards only apply if water is softened when the minimum standard is 60 mg/l as calcium.
Alkalinity	Alkalinity, like hardness, comes from the rocks through which the water has passed. Alkalinity is naturally present in water but can be altered through softening.	Standards only apply if water is softened when it is 30 mg/l as bicarbonate
Residual free chlorine	Chlorine added to water to neutralise bacteria. Some remains as 'residual free chlorine' to maintain wholesome water as it passes through the system and to the tap.	Results are compared against a long term average. Any significant difference is investigated.
Total coliforms Faecal coliforms Clostridia Faecal streptococci	These are bacteria which can be found sometimes in untreated water. Disinfection during treatment removes them. However, they may sometimes appear in tests in small numbers, although follow-up tests usually show that the mains water is satisfactory. Where necessary, their presence results in immediate investigatory work.	0/100 ml 0/100 ml Not more than 1/20 ml 0/100 ml

3.11 Drinking water quality standards *continued*

Parameters tested in the UK [1]	What it means	amount allowed
Colony count 1 Day Colony count 3 day	Small amounts of harmless bacteria can be present in treated water - as they are in foods like yoghurt. Water companies check the numbers of groupings of these bacteria. The information obtained helps maintain the efficiency of the water treatment process and the cleanliness of the water mains.	Results are compared against a long term average. Any significant difference is investigated.
Oxidisability	This is a very general screening test of operational significance only.	5 mg/l
Ammonium	Ammonium occurs naturally in water from some sources. It does not cause health problems and where it does occur, it can be controlled or removed by treatment.	0.5 mg/l
Nitrite Nitrate	Both these substances are found in water running over and through agricultural land.	0.1 mg/l 50 mg/l
Chloride	Chloride comes from the rocks through which water has passed. It is not harmful to health.	400 mg/l
Fluoride	Fluoride occurs naturally at varying levels. Some companies add fluoride at the request of health authorities.	1500 µg/l
Phosphorus Sulphate Magnesium	These substances occur naturally in water and come from mineral deposits.	2200 µg/l 250 mg/l 50 mg/l
Manganese	Manganese occurs naturally in water and is not harmful to health.	50 µg/l
Aluminium	Aluminium occurs naturally and is also used to remove impurities from water in some water treatment works. Its use in water treatment is very closely controlled and continually monitored.	200 µg/l
Calcium	Calcium is a naturally occurring substance, for example, in chalk, and is responsible for the degree of hardness of the water.	250 mg/l
Potassium	Potassium occurs naturally in water.	12 mg/l
Sodium	Sodium salts are naturally occurring and are a by-product of softening.	150 mg/l
Copper Zinc	Traces of these metals are occasionally found in water. They usually come from older pipework.	3000 µg/l 5000 µg/l
Iron	Iron is found naturally in some underground water. At sources where natural iron levels are high, treatment plants are provided to remove it. Iron is also used in water treatment where its use is closely controlled. It does not cause health problems.	200 µg/l
Lead	Lead was formerly used as a plumbing pipe material, particularly in customers' plumbing. Lead in amounts well above the standard can be a health risk if consistently consumed over many years. Soft water in particular can dissolve lead from lead pipes. 'Dosing' reduces plumbosolvency.	50 µg/l

3.11 Drinking water quality standards *continued*

Parameters tested in the UK [1]	What it means	amount allowed
Silver	These substances are rarely found in water.	10 µg/l
Antimony		10 µg/l
Arsenic		50 µg/l
Barium		1000 µg/l
Boron		2000 µg/l
Cadmium		5 µg/l
Chromium		50 µg/l
Cyanide		50 µg/l
Mercury		1 µg/l
Nickel		50 µg/l
Selenium		10 µg/l
Total organic carbon	By monitoring the level of naturally occurring carbon, water companies can ensure that treatment processes are working properly and no problems are developing.	Results are compared against long term average. Any significant difference is investigated.
Trihalomethanes	THMs derive from the combination of chlorine with organic matter	100 µg/l
Carbon tetrachloride	These substances arise from industrial processes but can be removed during treatment. Water companies work with the industries themselves to ensure they do not reach the water supply in the first place.	3 µg/l
Trichloroethene		30 µg/l
Tetrachloroethene		10 µg/l
Total Polyaromatic Hydrocarbons (PAHs)	PAHs are organic chemicals formed during heating or partially burning chemicals such as coal, wood or garden refuse. PAHs are widespread in the environment and have been detected in food, air and water.	200 ng/l
Benzo 3, 4 pyrene	A PAH.	10 ng/l
Surfactants	These substances come from washing powders	0.2 mg/l
Individual pesticides	Water companies test for the various herbicides and pesticides which may be used in their areas and which may be present in water. These come from their use by farmers, local authorities, gardeners etc. The traces found are no threat to health, being far smaller than the limits which the Government's medical advisers say would be necessary to protect health, but water companies are nevertheless taking steps to remove even these minute traces.	0.1 µg/l
Total pesticides		0.5 µg/l

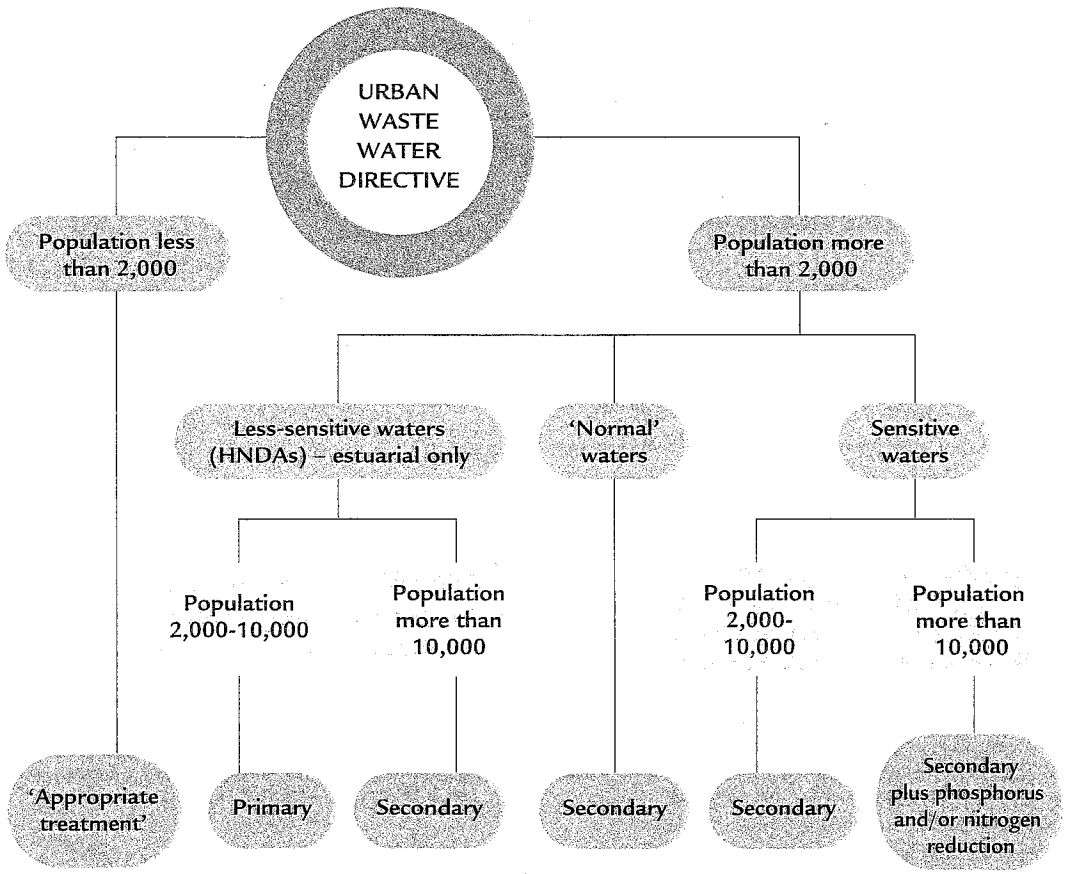
[1] *UK standards are based on European Directive 80/778/EEC although in some cases there are additional UK parameters, or those in the UK are more stringent, eg lead.*

Sewage and sludge

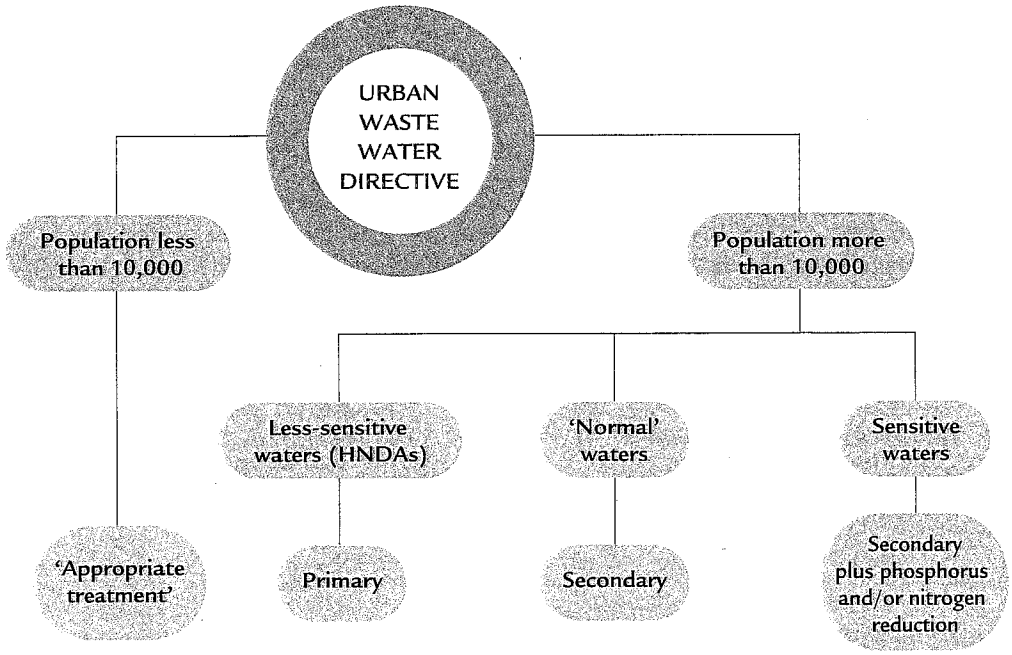
The EC Urban Waste Water Treatment Directive, 91/271/EEC (UWWTD), sets timetables for implementation between 1998 and 2005 and lays down minimum standards of treatment for municipal wastewater and the disposal of sewage sludge. It requires secondary treatment of municipal wastewater as a minimum, except in areas designated as less sensitive (High Natural Dispersion Areas – HNDAs) where at least primary treatment is required. However, if an area is designated as sensitive, nutrient removal may also be required. The implications of the Directive are shown in 4.1 and 4.2. The Directive specifically requires the elimination of sewage sludge disposition at sea by the end of 1998.

The EC Bathing Water Directive, 76/160/EEC, aims to improve the quality of bathing water and to protect public health. It sets standards for 19 physical, chemical and microbiological parameters. Some are mandatory and must not be exceeded except in specified circumstances while others are guidelines. The most widely used parameters are total and faecal coliform bacteria which are indicators of sewage pollution. The Directive requires that at least 95% of samples must have counts not exceeding the mandatory standards of 10,000/100ml for total coliforms and 2,000/100ml for faecal coliforms. A revision of the Directive has been proposed.

4.1 Levels of treatment required under UWWTD – estuarial and inland waters



4.2 Levels of treatment required under UWWTD – coastal waters



OUTLETS OF SEWAGE SLUDGE (BIOSOLIDS) AND SLUDGE PRODUCTS

The utilisation of sludge (biosolids) from sewage works is strictly controlled:

- the landfill outlet becomes more costly as sludge put to landfill became subject to the landfill tax from 1 October 1996
- depositing of sewage sludge at sea is controlled by licences issued by MAFF who monitor the effect on deposition grounds and set the licence conditions accordingly. Sea deposition of sewage sludge will end on 31 December 1998 under the terms of EC Directive 91/271/EEC (UWWTD)
- utilisation of sewage sludge (biosolids) to agricultural land is undertaken in accordance with detailed requirements laid down in the Sludge (Use in Agriculture) Regulations 1989 (as amended) which implements Directive 86/278/EEC on "the protection of the environment and in particular soil when sewage sludge is used in agriculture", and also the complementary Department of the Environment Code of Practice for the Agricultural Use of Sewage Sludge
- treatment of sewage sludge by thermal combustion is controlled by licences issued by the Environment Agency.

LOCAL AUTHORITY SEWERAGE ARRANGEMENTS IN ENGLAND AND WALES

Section 15 of the Water Act 1973 imposed a duty on water authorities to make arrangements to discharge certain of their sewerage functions through district councils in their area. Under the provisions of the Water Industry Act 1991, WSCs may still enter into such arrangements with local authorities. The terms of such arrangements are a matter for agreement between the relevant parties.

DISCHARGE CONSENTS

All sewage treatment works which discharge effluent (treated wastewater) to surface waters must do so in accordance with a consent issued by the Environment Agency. For each consent, limits may be set for the following three principal parameters as well as a host of other constituents:

- for 'suspended solids' – that is to say fine particulate matter
- for bio-chemical oxygen demand (BOD) – the extent to which organic matter in the water uses oxygen
- for ammonia – which is toxic to fish.

4.3 Sewerage and sewage treatment by population 1996/97

	population connected to sewer		population served by STWs by level of treatment				population connected to sea outfalls	
	000s	%	preliminary or none %	primary %	secondary %	tertiary %	short %	long %
Anglian	5,282	92	0	5	65	24	0	6
Dŵr Cymru	2,943	93	37	4	51	8	9	28
Northumbrian	2,580	98	30	38	29	3	14	8
North West	6,791	98	8	13	67	12	11	26
Severn Trent	8,300	98	0	0	68	32	0	0
Southern	3,916	95	25	17	45	13	3	21
South West	1,394	89	29	7	48	16	21	8
Thames	11,635	98	0	0	79	21	0	0
Wessex	2,397	94	10	25	51	14	4	6
Yorkshire	4,738	99	2	9	65	24	6	20
England and Wales	**49,976**	**96**	**8**	**8**	**64**	**19**	**4**	**10**
East Scotland	1,379	95	14	47	28	9	15	37
North Scotland	1,032	86	59	8	29	3	30	36
West Scotland	2,367	97	14	23	62	1	5	9
Northern Ireland	1,384	83	–	–	–	–	–	–
UK	**56,138**	**96**	**9**	**2**	**4**	**0**	**1**	**2**

Note: Figures may not add up due to rounding.

Source: Water companies, Scottish Office, DoE (NI) Water Service

SEWAGE TREATMENT

There are various processes that sewage can go through during treatment. These include:

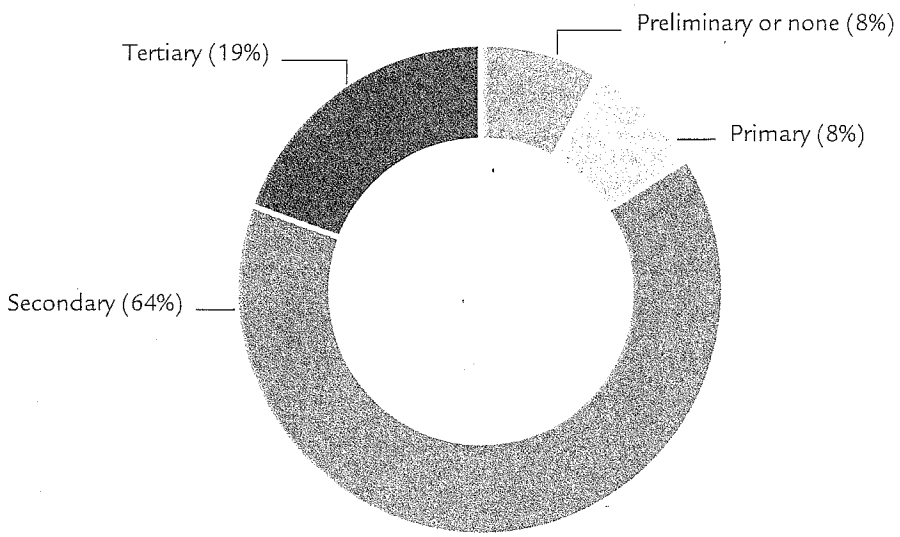
Preliminary treatment – the removal or disintegration of gross solids in sewage by passing it through screens. Grit, which comes from road drainage etc, may also be removed in specially designed tanks or channels. Sometimes oil and grease are removed prior to primary treatment.

Primary treatment – sewage flows into settling tanks where solid material sinks to the bottom. This is the first major stage of treatment and involves settlement of suspended solids. The BOD is reduced by 20% and total suspended solids are reduced by at least 50% before discharge.

Secondary treatment – there are two main types of secondary treatment, "biological filtration" and "activated sludge". Both rely on the action of natural bacteria to break down the organic matter that is left in the sewage after primary settlement. During biological filtration, the sewage is spread over a granular filter bed. As the sewage seeps down, bacteria, fungi and other organisms feed on the organic matter leaving a virtually clear liquid flowing from the base of the filter bed. The "activated sludge" method relies on a microbiological population being mixed in suspension with the wastewater under aerobic conditions.

Tertiary treatment – the removal of suspended matter and nutrients such as nitrogen and phosphorus to enable the effluent to comply with more stringent standards before discharge to a receiving water. Disinfection techniques, including UV treatment, may also be applied. Also termed 'polishing' or advanced treatment.

4.4 Levels of sewage treatment in England and Wales 1996/97



SLUDGE (BIOSOLIDS) TREATMENT, RECYCLING AND DISPOSAL

Sewage sludge is the by-product of sewage treatment and is viewed as a valuable resource due to its soil conditioning properties and fertiliser value. Sludge may be applied to agricultural land in its raw form but in order to reduce odour and bulk, sludge may be treated by a variety of different methods:

Dewatering – a process whereby wet sludge, sometimes chemically conditioned, has its water content reduced by mechanical means. Methods include centrifuging and belt presses. Dewatered sludge contains 5-40% dry solids.

Thickening – a process of increasing the concentration of solids in sludge by the removal of water eg by sun drying or by gravity.

Digestion – a biological process using bacteria and other micro-organisms to break down organic matter. This reduces the volume of sludge solids and the sludge is changed from a dark brown, often pungent liquid to a black, tarry liquid suitable for utilisation.

Composting – the aerobic fermentation of waste organic matter, including organic house refuse and sewage sludge.

Thermal drying – high temperature drying technique which reduces sludge into a granular form (approximately 80% dry solids).

Incineration/combustion – high temperature oxidation of sludge organic material to produce an inert ash. Usually the heat generated is recovered.

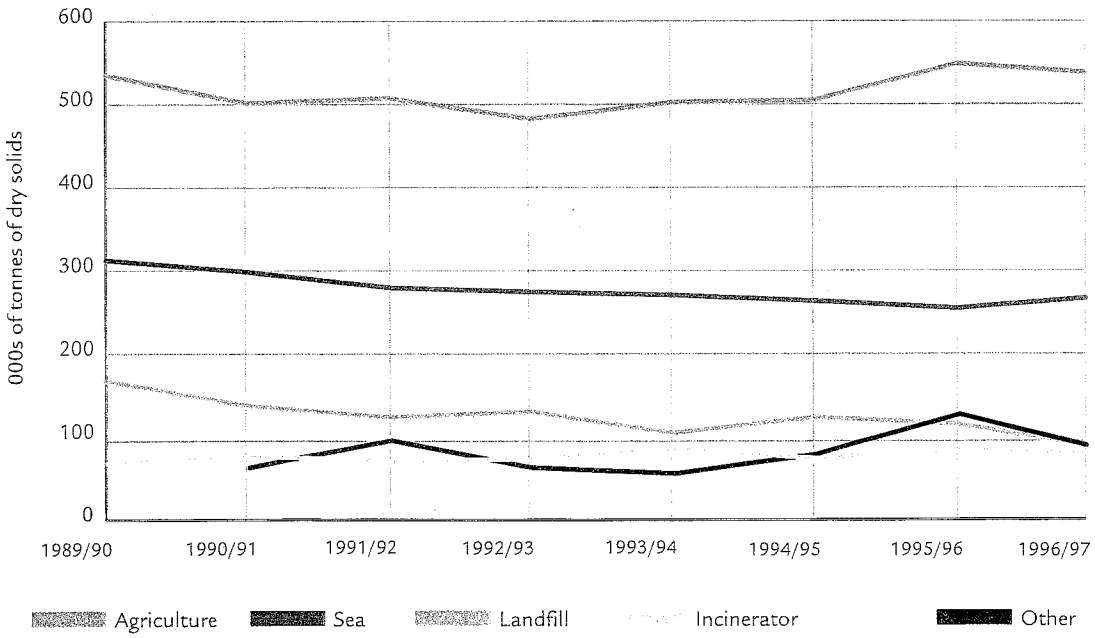
4.5 Outlets for sewage sludge 1996/97

	farmland	landfill	sea	incinerator	other	TOTAL[1]
	000s of tonnes of dry solids					
Anglian	98	1	11	0	14	125
Dŵr Cymru	26	0	0	0	1	27
Northumbrian	1	4	24	0	2	31
North West	42	17	61	6	0	127
Severn Trent	81	42	0	28	5	156
Southern	43	9	5	8	0	65
South West	13	0	2	0	0	15
Thames	119	0	73	0	67	259
Wessex	29	2	0	0	5	37
Yorkshire	32	17	5	46	0	100
England & Wales	**486**	**93**	**182**	**88**	**94**	**942**
%	52	10	19	9	10	100
East Scotland	16	2	16	0	0	34
North Scotland	10	0	2	-	-	12
West Scotland	6	0	52	-	1	60
Northern Ireland	17	2	12	0	0	31
UK	**535**	**97**	**264**	**88**	**95**	**1,079**
%	50	9	24	8	9	100

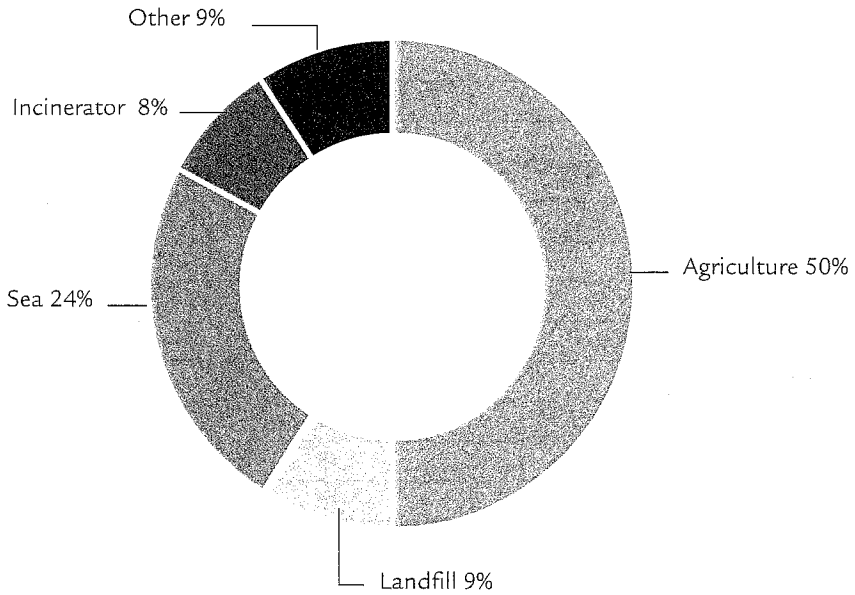
[1] *Totals may not add due to rounding.*

Source: Water companies, Scottish Office, DoE (NI) Water Service

4.6 Outlets for sewage sludge in the UK 1989/90 to 1996/97



4.7 Outlets for sewage sludge in the UK 1996/97



4.8 Sewage treatment works – compliance with numeric discharge consents

	number of works monitored						% monitored that comply					
EA[1] region	1990	1991	1992	1993	1994	1995	1990	1991	1992	1993	1994	1995
Anglian	704	692	685	688	687	686	88	92	98	96	97	98
North East	516	506	496	448	486	463	94	94	94	95	95	96
North West	375	373	353	356	355	356	96	97	98	97	97	98
Midlands	788	771	778	760	746	731	91	98	98	96	99	98
Southern	268	266	252	258	275	275	89	94	99	97	99	99
South Western	502	496	523	525	507	505	87	86	85	84	89	90
Thames	379	379	372	371	368	367	92	94	95	95	95	98
Welsh	667	578	577	639	630	621	87	95	96	93	94	97
England & Wales[2]	**4,199**	**4,061**	**4,036**	**4,045**	**4,054**	**4,004**	**90**	**94**	**95**	**94**	**96**	**97**

1 Previously the National Rivers Authority
2 Totals may not add due to rounding

Source: Environment Agency

4.9 River and canal quality 1990 – 1996*

Percentage of river and canal in each GQA chemical grade %

	good quality				fair quality				poor quality		bad quality	
	Class A		Class B		Class C		Class D		Class E		Class F	
EA[1] region	1990	1996	1990	1996	1990	1996	1990	1996	1990	1996	1990	1996
Anglian	0.8	5.6	16.6	31.6	37.1	31.3	26.1	18.9	17.2	12.2	2.2	0.6
Midlands	7.9	12.6	26.6	32.9	28.2	30.9	17.4	12.9	17.6	9.9	2.3	0.9
North East	27.1	28.6	43.2	29.2	13.0	17.0	7.2	10.7	8.1	12.4	1.4	2.1
North West	22.5	20.2	19.4	32.3	17.4	21.0	13.9	10.7	20.3	13.1	6.5	2.7
Southern	10.9	14.2	32.7	40.2	30.6	26.0	13.4	10.0	10.9	9.0	1.5	0.6
South West	24.5	40.4	39.8	36.1	18.4	15.5	11.0	4.4	5.3	3.3	1.0	0.3
Thames	8.9	13.1	27.8	35.8	29.7	26.9	16.4	15.3	15.9	8.6	1.3	0.2
Welsh	44.3	73.0	35.1	18.5	10.6	5.2	5.7	1.6	3.3	1.6	1.0	0.1
Total[2]	**18.0**	**27.1**	**29.9**	**31.5**	**23.5**	**21.2**	**14.4**	**10.3**	**12.2**	**8.8**	**2.1**	**1.0**

** These figures relate to 1988-90 and 1994-96*

Source: Environment Agency

[1] Previously National Rivers Authority

[2] Totals may not add due to rounding

4.10 Percentage estuary length by NWC water quality class (%)*

	GOOD QUALITY A		FAIR QUALITY B		POOR QUALITY C		BAD QUALITY D	
EA[1] region	1990	1996	1990	1996	1990	1996	1990	1996
Anglian	79.1	67.8	13.5	22.9	7.1	1.7	0.3	6.9
Midlands	14.3	55.9	60.8	44.1	24.9	0	0	0
North East	29.2	43.3	39.3	33.3	23.8	18.8	7.7	4.6
North West	48.9	54.3	22.6	22.4	13.2	10.5	15.3	12.8
Southern	75.5	76.3	21.0	20.8	3.5	2.9	0	0
South West	80.0	77.7	18.9	21.6	1.1	0.7	0	0
Thames	45.2	34.9	54.8	65.1	0	0	0	0
Welsh	78.2	73.8	20.1	24.5	1.7	1.7	0	0
Total	**66.3**	**65.7**	**24.1**	**25.9**	**6.5**	**4.1**	**3.1**	**4.1**

** These figures are given on a calendar year basis.*

[1] Previously National Rivers Authority

Source: Environment Agency

RIVER AND CANAL QUALITY

The quality of rivers and canals has improved significantly since 1990 with a 26% net upgrading. While sewage effluent is only one of many factors that affect river quality, improvement to sewage treatment has been an important contributor to this upgrading. Surveys are carried out using the NRA's General Quality Assessment (GQA) scheme which assigns stretches of river and canals to one of six chemical water grades based on different degrees of quality – from A for water of the very highest quality to F for water which is of bad quality.

Under the GQA scheme, water quality grades are calculated using the results of three years' sampling. This reduces any bias which might arise, for example, by unusual weather conditions in any one year.

4.11 Bathing water quality compliance (Directive 76/160/EEC) – Coliform results

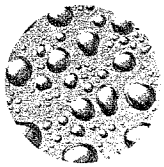
Number of identified bathing waters

	1988		1989		1990		1991		1992		1993		1994		1995		1996	
EA[1] region	pass	total	pass	total	pass	total	pass	total	pass	total	pass	total	pass	total	pass	total	pass	total
Anglian	19	28	23	28	27	29	29	33	31	33	28	33	27	33	30	34	34	35
Northumbria	9	19	20	32	21	32	21	33	20	34	46	56	49	56	53	56	49	56
Yorkshire	21	22	18	22	17	22	19	22	20	22	13	33	24	33	15	33	20	33
North West	6	33	11	33	10	33	10	33	11	33								
Severn Trent	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Southern	27	65	45	65	48	66	45	67	51	67	58	67	53	67	62	67	62	69
South West	92	109	113	132	118	133	105	133	117	134	142	175	151	175	167	176	167	180
Wessex	30	38	31	38	39	39	36	39	36	39								
Thames	0	2	3	3	3	3	2	3	3	3	3	3	2	3	3	3	2	3
Welsh	37	48	40	48	35	50	45	51	39	51	42	51	39	51	49	56	52	57
England & Wales	**241**	**364**	**304**	**401**	**318**	**407**	**312**	**414**	**328**	**188**	**332**	**418**	**345**	**418**	**379**	**425**	**386**	**433**
% compliance	**66**		**76**		**78**		**75**		**79**		**79**		**83**		**89**		**89**	
Scotland:	12	23	16	23	12	23	15	23	15	23	18	23	16	23	19	23	21	23
• East Scotland															8	8	7	7
• North Scotland															7	7	8	8
• West Scotland															4	8	6	8
Northern Ireland	14	16	16	16	15	16	16	16	15	16	15	16	15	16	15	16	16	16
UK	**267**	**403**	**336**	**440**	**345**	**446**	**343**	**453**	**358**	**227**	**365**	**457**	**376**	**457**	**413**	**464**	**423**	**472**

[1] *Previously National Rivers Authority*

Source: Environment Agency: Bathing Water Quality in England and Wales in 1996: a Summary Report, Scottish Office, DoE (NI) Water Service

Price limits and charges



Water and sewerage charges in England and Wales are regulated by means of a limit on the average increase in charges which a company can impose in any year. The limit is applied to a 'tariff basket' of charges for water and sewerage services (including trade effluent charges), covering both business customers and households. Some charges eg, the infrastructure charge are outside the tariff basket.

Charges may be increased each year by the movement in the RPI index in the twelve months to November prior to the charging year, plus K where K reflects how much a company needs to increase charges, above inflation, to finance its services and meet its legal obligations. In the past K has been positive for most companies, but some companies, following the 1994 price review, have negative Ks. Tables 5.1 and 5.2 provide information on price limits and K factors.

Price limits are set for ten years but may be reviewed after five years if either the Regulator or the company wish. Price limits for the period immediately following privatisation were set in 1989 by the Government. During 1994, the Director General completed the first periodic review of price limits, covering the period 1995/6 to 2004/05. In October 1996 the Director General announced a further review of price limits to be completed in 1999. The new price limits will take effect from 1 April 2000.

In May 1997, OFWAT published a consultation paper on the tariff basket. This deals with the formulae used to calculate the annual increase in the tariff basket on the basis of individual price charges. Any changes resulting from the review will come into effect on 1 April 2000.

Prices can be changed between periodic reviews, by means of an interim determination, if there are major changes in certain circumstances – such circumstances are set out in a company's licence. In addition companies can defer increases in price limits if they wish. Merger activity in the water industry has also led to reductions in previously agreed price limits, eg, in the case of the Lyonnaise/Northumbrian merger, revenue from water services is to be reduced by 15% by 2001/02. Some companies have given customers rebates, details are to be found in Table 5.5.

In Scotland, prices are set by agreement between the water authority and the Customer Council, with provision for arbitration by the Secretary of State for Scotland if agreement is not reached. From 1993/94 to 1995/96, the sewerage charge was paid through the council tax. Now there is a separate sewerage charge. To phase this in, the Government is assisting charge payers by providing domestic sewerage charge relief. The water authorities, as a consequence, are forgoing income, and are reimbursed by Government grant. The figures quoted in table 5.6 do not take into account the sewerage charge relief.

CHARGING ARRANGEMENTS IN ENGLAND AND WALES

Each company is responsible for its own charging policy. Charging structures vary between companies, depending on local circumstances. One of Ofwat's responsibilities is to ensure that there is no undue discrimination or preference in a company's water and sewerage charges.

Most domestic customers (90% in 1996/7) pay a bill that is based in part on the rateable value of their property. The domestic rating system was discontinued in 1990 as a system of raising revenue for local government. At privatisation, the water companies were permitted to continue the use of rateable values for charging purposes until 2000. The Government is currently reviewing the system of water and sewerage charging.

It is estimated that 10% of domestic customers will be metered in 1997/98. All companies offer an optional meter scheme, so that domestic customers paying an unmeasured charge can opt for a meter if they so wish. In addition, most but not all companies meter new properties, which do not have rateable values assigned to them. Most companies charge extra fees or meter customers with high volume consumption eg customers with swimming pools, ornamental ponds or sprinklers.

Sewerage charges for metered users are based on the volume of water delivered less a small allowance (typically 5%) for water not discharged to sewer. Sewerage charges also contain elements for surface drainage (run-off from properties) and highway drainage (run-off from roads and pavements).

The majority of business customers (nearly 80%) are metered. Their water charges depend partly on the volume of consumption and partly on the size of the supply pipe. In the case of trade effluent discharged to sewer, the charge is based on volume modified by factors which relate to the strength of the effluent (see table 5.10). Business customers that are not metered are typically those occupying quasi-domestic premises eg shops or small hotels.

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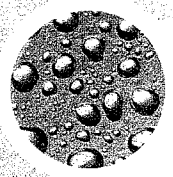


5.1 Price limits for 1995-96 to 2004-05 (%)[1]

	ANNUAL PRICE LIMITS			
	1995/96	1996/97	1997/98 to 1999/00	2000/01 to 2004/05
Water service companies				
Anglian	1.5	1.5	1.5	1.5
Dŵr Cymru	0.5	0.5	0.5	0.5
North West	2.5	2.5	2.5	0.0
Northumbrian[2]	1.9	1.4	0.4	0.9
Severn Trent	0.5	0.5	0.5	0.0
South West[3]	1.5	0.5	1.0	0.0
Southern	4.0	4.0	4.0	3.0
Thames	0.5	0.5	0.5	0.5
Wessex	1.5	1.5	1.5	0.5
Yorkshire[4]	2.5	2.5	1.7	0.0
Average (weighted)	**1.5**	**1.4**	**1.3**	**0.6**
Water supply companies				
Bournmouth & West Hampshire	-0.5	-0.5	-0.5	-0.5
Bristol	1.0	1.0	1.0	-3.0
Cambridge	-2.0	-2.0	-0.2	-2.0
Chester	-3.0	-1.0	-1.0	-1.5
Cholderton	-1.7	0.0	0.0	0.0
Essex and Suffolk	2.0	2.0	2.0	-1.5
Folkestone and Dover	-0.5	-0.5	-0.5	-1.0
Hartlepool	1.5	1.5	1.5	0.5
Mid Kent	1.0	1.0	1.0	-1.0
Mid Southern	-2.4	-1.0	-1.0	-1.0
North Surrey	2.0	2.0	2.0	-1.5
Portsmouth[5]	-2.3	-1.8	-1.5	-0.5
South East	-1.0	-1.0	-1.0	-1.0
South Staffordshire	-4.1	-0.5	-0.5	-1.0
Sutton and East Surrey[6]	–	-1.2	-2.4	n/a
Tending Hundred	-0.5	-0.5	-0.5	-0.5
Three Valleys	2.5	2.5	2.5	-1.0
Wrexham	-2.0	-2.0	-2.0	-2.0
York	-1.1	0.0	0.0	0.0
Average (weighted)	**-0.4**	**0.5**	**0.5**	**-1.3**
Industry average (weighted)	**1.3**	**1.3**	**1.2**	**0.4**

[1] *Companies are permitted to increase charges each year, on average, by RPI plus (or minus) the limit shown in this table.*

[2] *On April 1996, Northumbria Water Limited and North East PLC merged. The new company prices are limited by a single K. For 1995/96, North East's K was -3.5.*

[3] *South West Water and Portsmouth Water referred the DG's 1994 determination to the MMC and decisions were announced in July 1995. The MCC determined South West Water's K at 1% for 1995/96 to 1999/00, but delayed implementation until 1996/97.*

[4] *This includes K=0 for 1997/98, as agreed between the DG and Yorkshire Water in 1996.*

[5] *Portsmouth's K was altered from -1.5% to -0.5% for 2000/01 to 2004/05 by the MMC.*

[6] *This company was formed on 1 April 1996 by the merger of East Surrey Water PLC and Sutton District Water PLC. For 1995/96, East Surrey's K was 3.0 and Sutton's K was -2.5.*

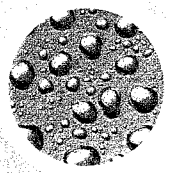
Source: Ofwat

5.2 Increase in standard charges 1997/98 (%)

	K	charge limit RPI+K+U (RPI=2.7%)	tariff basket increase	difference between charge limit and tariff basket increase
Water service companies				
Anglian	1.5	4.3	4.3	0.0
Dŵr Cymru	0.5	3.8	3.3	0.5
North West	2.5	5.3	5.3	0.0
Northumbrian	1.9	4.7	4.2	0.5
Severn Trent	0.5	3.2	3.0	0.2
South West	1.0	3.7	3.7	0.0
Southern	4.0	7.7	6.7	1.0
Thames	0.5	3.2	3.2	0.0
Wessex	1.5	4.2	4.2	0.0
Yorkshire	0.0	2.8	2.0	0.8
Water supply companies				
Bournemouth & West Hampshire	-0.5	2.2	2.2	0.0
Bristol	1.0	3.7	3.7	0.0
Cambridge	-2.0	0.7	0.4	0.3
Chester	-1.0	1.7	1.7	0.0
Cholderton	0.0	2.7	2.7	0.0
Essex & Suffolk	2.0	4.7	4.2	0.5
Folkestone & Dover	-0.5	2.2	2.2	0.0
Hartlepool	1.5	4.3	4.0	0.2
Mid Kent	1.0	3.7	3.7	0.0
Mid Southern	-1.0	1.7	1.7	0.0
North Surrey	2.0	4.7	1.7	3.0
Portsmouth	-1.5	1.2	1.0	0.3
South East	-1.0	1.7	1.7	0.0
South Staffordshire	-0.5	4.2	3.2	1.0
Sutton & East Surrey	-1.2	1.5	1.0	0.5
Tendring Hundred	-0.5	2.2	0.7	1.5
Three Valleys	2.5	5.2	5.2	0.0
Wrexham	-2.0	0.7	0.7	0.0
York	0.0	2.8	2.8	0.0

Notes:
Figures shown to one decimal place.
U represents underspend in the charges limit in previous years. K + U is therefore the permitted increase in charges over and above inflation. The final column is the amount of K deferred and available for use in later years.

Source: Ofwat



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INFRASTRUCTURE CHARGES

Companies charge developers (or owners of properties wishing to connect to the public system for the first time) for providing a new mains water supply or connection to a public sewer. Costs may be recovered by means of a connection charge (covering the direct costs of connection) and an infrastructure charge (covering the cost of remote infrastructure associated with servicing extra customers, including the provision of additional resources and treatment works). Connection charges are set by companies, but, following the 1994 price review, the infrastructure charge for 1995/96 was set at £200 and this will subsequently rise at the rate of inflation only. In 1997/8 the typical charge is £211. Infrastructure charges for earlier years are to be found in previous editions of Waterfacts.

5.3 Main price indices used in the water industry

	RPI November	RPI annual average	COPI	CCI
Annual figures				
1988-89	110.00	108.90	89.50	100.00
1989-90	118.50	117.40	99.25	105.00
1990-91	130.00	128.70	99.25	111.00
1991-92	135.60	134.90	91.25	110.00
1992-93	139.70	139.10	83.75	108.00
1993-94	141.60	141.50	82.25	108.00
1994-95	145.30	145.40	87.00	116.00
1995-96	149.80	150.10	95.25	119.00
1996-97	153.90	153.70	98.30	125.00[1]
Percentage changes on previous year (%)				
1989-90	7.7	7.8	10.9	5.0
1990-91	9.7	9.6	0.0	5.7
1991-92	4.3	4.8	-8.1	-0.9
1992-93	3.0	3.1	-8.2	-1.8
1993-94	1.4	1.7	-1.8	0.0
1994-95	2.6	2.8	5.8	7.4
1995-96	3.1	3.2	9.5	2.6
1996-97	2.7	2.4	3.1	5.0

Note: some figures have been revised in this edition of Waterfacts

[1] At the time of going to press this figure is provisional

PRICE INDICES

This table provides information on price indices that are widely used in the water industry.

The November RPI is used in the RPI + K price cap formula (the charges limit for the year 1996/97 is based on the RPI increase between November 1994 and November 1995, plus K).

The Annual Average RPI on a financial year basis is used to revalue financial information to a common price basis, eg in Ofwat's annual financial performance report.

The DoE's Construction Price Index (COPI) is an index covering a variety of construction sectors, not just water. At privatisation it was specified in company licences as the index to be used in checking whether construction price movements should trigger an interim determination, and in determining the required size of the adjustment. Subsequently some, but not all, companies have agreed with Ofwat to delete this part of the licence, and have taken on construction price risk themselves.

The Capital Cost Index (CCI) is a water industry specific index of capital price movements used by the companies to help manage their capital programmes. It is prepared by WRc and London Economics and managed by an industry steering group. The figures represent the movements in the out-turn costs of a national sample of stylised projects.

5.4 Average weekly cost of water and sewerage services to unmeasured domestic customers in England and Wales

	82/83	83/84	84/85	85/86	86/87	87/88	88/89	89/90	90/91	91/92	92/93	93/94	94/95	95/96	96/97	97/98
£/week	1.29	1.38	1.48	1.65	1.78	1.90	2.05	2.28	2.57	2.95	3.26	3.55	3.82	4.05	4.19	4.46

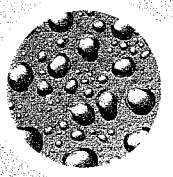
Source: Ofwat

5.5 Annual rebates to customers in 1995-96, 1996-97 and 1997-98 (£)

	1995-96		1996-97		1997-98	
	Water	Sewerage	Water	Sewerage	Water	Sewerage
Anglian	3.00	3.00	0.00	0.00	0.00	0.00
Dŵr Cymru	0.00	0.00	4.50	4.50	4.50	4.50
North West	3.25	3.25	3.25	3.25	5.00	5.00
Severn Trent	0.00	4.00	0.00	6.50	6.50	0.00
South West[1]	5.00	5.00	10.00		15.00	
Yorkshire	5.00	5.00	0.00	0.00	0.00	0.00

[1] South west's rebate is now on a per customer basis and not a per service basis

Source: Ofwat and South West Water



5.6 Average unmeasured charges 1996/97 and 1997/98 (weighted) £

	water supply		sewerage		TOTAL[1]	
	1996/97	1997/98*	1996/97	1997/98*	1996/97	1997/98*
Water service companies						
Anglian[2]	135	138	160	170	295	307
Dŵr Cymru[2]	128	132	136	142	264	274
Northumbrian	98	100	111	118	208	218
North East[3]	95	97	111	118	206	215
North West[2]	93	94	109	117	202	211
Severn Trent[2]	86	88	106	112	192	207
Southern	96	102	134	143	230	245
South West[2]	124	125	201	212	325	337
Thames	87	92	95	98	182	190
Wessex	116	120	130	136	246	256
Yorkshire[2]	104	107	114	116	218	223
Water supply companies						
Bournemouth & West Hampshire	94	97				
Bristol	101	107				
Cambridge	104	110				
Chester	111	113				
Cholderton	-	-				
Essex & Suffolk	117	121				
Folkestone & Dover	118	123				
Hartlepool	88	91				
Mid Kent	133	138				
Mid Southern	114	116				
North Surrey	109	112				
Portsmouth	72	72				
South East	160	163				
South Staffordshire	77	79				
Sutton & East Surrey	136	138				
Tendring Hundred	153	158				
Three Valleys	107	114				
Wrexham	132	133				
York	87	89				
Weighted industry average	**102**	**105**	**117**	**124**	**218**	**232**
Northern Ireland[4]	–	–	–	–	–	–
Scotland:	67	–	48	–	115	–
• North Scotland	72	77	53	57	125	134
• East Scotland	66	69	55	49	121	118
• West Scotland	64	68	43	45	107	112

** Forecasts*

[1] Totals may not add due to rounding

[2] Figures include rebates ie, figures represent the actual charges to customers

[3] Although North East has merged with Northumbrian, some charges are still separate.

[4] Northern Ireland unmeasured charges are not levied but are deemed to be recovered as an element of the regional rate.

Source: Water companies, Ofwat, Scottish Office, DoE (NI) Water Service

5.7 Average household bill measured charges 1996/97 and 1997/98 (weighted) £

	water supply		sewerage		TOTAL[1]	
	1996/97	1997/98*	1996/97	1997/98*	1996/97	1997/98*
Water service companies						
Anglian[2]	99	96	119	122	218	218
Dŵr Cymru[2]	143	146	147	153	290	299
Northumbrian	89	87	106	107	194	194
North East[3]	88	82	106	107	193	189
North West[2]	96	86	104	122	206	208
Severn Trent[2]	105	98	106	111	218	216
Southern	90	94	116	125	206	219
South West [2]	100	101	162	165	262	266
Thames	84	89	91	97	175	186
Wessex	105	106	116	121	221	227
Yorkshire	88	88	96	96	184	184
Water supply companies						
Bournemouth & West Hampshire	97	99				
Bristol	85	79				
Cambridge	95	90				
Chester	72	68				
Cholderton	128	127				
Essex & Suffolk	105	111				
Folkestone & Dover	125	125				
Hartlepool	79	84				
Mid Kent	108	111				
Mid Southern	83	82				
North Surrey	109	112				
Portsmouth	85	84				
South East	123	124				
South Staffordshire	66	65				
Sutton & East Surrey	153	136				
Tendring Hundred	103	113				
Three Valleys	91	94				
Wrexham	97	98				
York	103	96				
Weighted industry average	**99**	**96**	**113**	**116**	**212**	**213**
Northern Ireland	n/a	n/a	n/a	n/a	n/a	n/a
Scotland	n/a	n/a	n/a	n/a	n/a	n/a

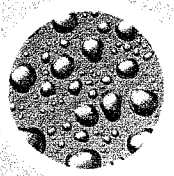
** Forecasts*

[1] Totals may not add due to rounding

[2] Figures include rebates ie. figures represent the actual charges to the customer

[3] Although North East has merged with Northumbrian, some charges have not yet been reconciled.

Source: Water companies, Ofwat, Scottish Office, DoE (NI) Water Service



5.8 Measured charges for household customers 1997/98 – Water service companies

	WATER SUPPLY			SEWERAGE			
	volumetric charge p/m	standing charge £/yr	average bill 97/98 £	volumetric charge[1] p/m	standing charge £/yr	RV charge p/£rv	average bill £
Anglian - Standard[1]	74.45	24.00	96	109.05	12.00	–	122
Anglian - SoLow	106.45	0.00	0	125.06	0.00		
Dŵr Cymru[2]	79.00	23.00	[5]111	100.86	11.00	–	[5]130
Northumbrian			83	39.93	63.60	–	107
• Northumbrian	55.83	24.00					
• North East	53.06	24.00					
North West[2]	61.50	23.00	86	11.00 + 57.00[3]	53.90	–	122
Severn Trent[2]	67.99	27.00	105	54.75	–[4]	–	
• Zone 1						19.26	
• Zone 2						16.22	
• Zone 3						17.20	
• Zone 4						18.57	
• Zone 5						21.71	
• Zone 6						21.03	
• Zone 7						20.47	
• Zone 8						17.20	
Southern	58.40	24.40	94	79.09	34.00	–	125
South West[2]	81.38	18.60	108	148.65	9.00	–	173
Thames	53.62	19.00	89	44.74	38.00	–	97
Wessex	77.76	24.00	106	79.81	36.00	–	121
Yorkshire	69.80	23.00	88	86.07	18.00	–	96

* *Forecasts*

[1] *Anglian has two tariff options available to measured household customers.*

[2] *Average bills for these companies exclude customer rebates paid in 1997-98. See Table 3 Ofwat 1997-98 Report on tariff structure and charges, for details of rebates.*

[3] *North West has a standing charge of £11 to recover customer-related costs, and a fixed charge of £57 to recover surface water and highway drainage costs.*

[4] *Severn Trent does not have a meter standing charge for households. Surface and highway drainage costs are recovered through the RV charge. Properties without a RV pay a charge related to property type: Flat/terrace – £17.40, Semi-detached – £34.80, Detached – £52.20.*

[5] *The difference between the average bill for Wales in tables 5.8 and 5.7 is accounted for by different assumptions on average volumes per household.*

Source: Ofwat

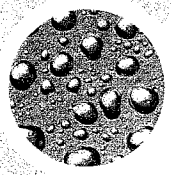
5.9 Measured charges for household customers 1997/98 – Water supply companies

Water supply companies	volumetric charge p/m[1]	standing charge £/yr	average bill* 97/98 £
Bournemouth & West Hampshire	56.68	18.00	99
Bristol	59.60	21.00	79
Cambridge	57.20	22.80	90
Chester	54.27	23.00	68
Cholderton	76.40	20.00	127
Essex & Suffolk:		22.50	111
• Essex	61.08		
• Suffolk	84.36		
Folkestone & Dover	65.00	18.00	125
Hartlepool	38.50	24.00	84
Mid Kent	68.34	18.00	111
Mid Southern	59.53	19.50	82
North Surrey	62.11	19.50	112
Portsmouth[1]	41.20	22.00	84
South East:		19.50	124
• Eastbourne	104.24		
• Mid Sussex	109.15		
• West Kent	86.56		
South Staffordshire	52.82	14.50	65
Sutton & East Surrey:			136
• East Surrey	81.00	24.00	
• Sutton	50.00	24.00	
Tendring Hundred	98.50	23.00	113
Three Valleys	54.69	22.00	94
Wrexham	68.36	23.00	98
York	48.60	22.40	96

* *Forecasts*

[1] *These charges apply from 1 July 1997.*

Source: Ofwat and water companies



TRADE EFFLUENT CHARGES

All businesses in England and Wales which discharge a trade effluent into a public sewerage system are charged for reception of that effluent and for the treatment given, which depends on the strength of the effluent. Charges are averaged across the region and may not reflect costs incurred at any one treatment works. Businesses are not obliged to use the public system and some may undertake part of the treatment themselves.

In 1994/5, £163m (about 6% of total sewerage revenue) was derived from trade effluent charges. Revenue is likely to rise as more sophisticated treatment processes are introduced as a result of EU directives, and the extra costs are reflected in charges.

Trade effluent charges are set by individual companies based on the MOGDEN formula. The charging formula apportions a cost to each stage of the treatment process and takes into account the way that a particular firm's effluent differs from the normal, average composition of sewage in the region. Charges are made for the elements of reception, conveyance, treatment and disposal actually given to the trade effluent.

The Mogden formula is:
C= R+[(V+Bv) or M]+B(Ot/Os)+S(St/Ss)

Some companies have modified this basic formula with the addition of one or more of the following factors: Bv (or Vb), Md (or Vm) or M.

5.10 Trade effluent charges 1997/98

	AVERAGE REGIONAL STRENGTH		APPORTIONMENT OF CHARGE						MINIMUM
	Os	Ss	R	V	Bv	M	B	S	CHARGE
	mg/l	mg/l	p/m³	p/m³	p/m³	p/m³	p/m³	p/m³	£
Anglian - Standard	456	383	11.42	17.88	3.46	9.58	38.66	21.88	125.00
Anglian - Industrial[1]	456	383	10.06	15.74	3.05	8.44	34.06	19.27	
Dŵr Cymru	500	350	13.00	7.57	3.03	11.21	34.90	35.20	107.00
Northumbrian	386	187	20.44	10.03	-	-	39.51	41.34	253.00
North West	364	235	10.80	8.60	1.20	8.10	24.16	27.66	108.00
Severn Trent	351	343	15.98	15.07	-	-	25.70	19.61	110.42
Southern	452	512	21.16	15.45	2.49	2.72	45.08	27.24	135.00
South West	744	489	33.45	30.83	-	-	72.98	66.30	124.80
Thames	445	336	6.74	8.29	-	-	29.35	49.54	72.00
Wessex	802	313	19.50	12.60	-	-	25.62	33.53	170.00
Yorkshire	931	336	17.46	20.06	-	-	21.77	37.08	200.00

Notes:

[1] Choosing the Streamline Industrial tariff entitles Anglian's customers to be charged at industrial trade effluent charges

R = reception and conveyance.
V = primary treatment (V for volumetric).
Bv = additional volume charge if there is biological treatment.
M = treatment and disposal where effluent goes to a sea outfall (M for marine).
Ot = chemical oxygen demand (COD) of effluent after one hour quiescent settlement at ph 7.
Os = COD of crude sewage after one hour quiescent settlement.
St = total suspended solids (mg/litre) of trade effluent at ph 7.
Ss = total suspended solids (mg/litre) of crude sewage.
B' = B/Os, ie B corrected for average regional strength
S' = S/Ss ie S corrected for average regional strength
B = biological oxidation of settled sewage.
S = treatment and disposal of primary sludge.

Charges for B and S are usually expressed in p/m³ relative to standard strength (concentration: usually expressed in mg/litre). Standard strengths vary from company to company. To maintain comparability, the charges shown here (B' and S') are corrected for standard strength and shown as p/kg.

Charges are calculated according to the Mogden formula: Charge = R+[(V+Bv) or M]+B(Ot/Os)+S(St/Ss)

Source: Ofwat

5.11 Water company trade effluent charging formula 1997/98

Water service company	Current charging formula
Anglian[1]	C = R + (V or Vb or Vm or M) + (Ot/Os) B + (St/Ss) S
Dŵr Cymru	C = R + V + Vb + (Ot/Os) B + (St/Ss) S
Northumbrian	C = R + V + (Ot/Os) B + (St/Ss) S
North West	C = R + M + V + B1 + (Ot/Os) B2 + (St/Ss) S
Severn Trent	C = R + V + (Ot/Os) B + (St/Ss) S
Southern	C = R + V + (Ot/Os) B + (St/Ss) S
South West	C = R + V (or Vm) + (Ot/Os) B + (St/Ss) S
Thames	C = R + V + (Ot/Os) B + (St/Ss) S
Wessex	C = R + V + (Ot/Os) B + (St/Ss) S
Yorkshire	C = R + P + (Ot/Os) B + (St/Ss) S

[1] *Modifications to codes include:*
VB = V + Bv
VM = M
M = Md + M
P = the cost per cubic metre of the preliminary treatment of foul sewage (including such preliminary treatment as is appropriate to the circumstances of the receiving waste water treatment works in question)

6 Finance and investment

This chapter provides information on the finances and capital investment of the regulated (so called "appointed") water and sewerage businesses in England and Wales. Figures are provided for each of the water and sewerage companies separately and the water supply companies as an aggregate. All figures are at prices for the year in question (except where specified). Some further information on capital expenditure is provided for the EA and the rest of the UK.

In contrast to some earlier editions of Waterfacts, no information is provided from the plc accounts of the wider group of which the appointed business is a member. Both plc accounts and regulatory accounts are available on request from the companies concerned.

All accounting information is provided on a current cost accounting (CCA) basis. Details of accounting policies are to be found in notes to the regulatory accounts, in regulatory accounting guidance published by Ofwat and, in the case of infrastructure accounting, also in Waterfacts 1993.

Infrastructure assets (usually underground assets) are not depreciated because they are maintained in perpetuity. Instead an annual charge is made to the profit and loss account representing the expected cost of maintaining these assets.

The total revenue or turnover of the industry from providing water and sewerage services was about £6.2bn in 1996/97. The turnover from sewerage was slightly higher than the turnover from water in 1996/97.

In 1996/97 £1.7bn of revenue (28% of the total) was derived from 'metered' customers. Currently, 10% of households are metered and nearly 80% of non-households (business customers). Separate information on revenue derived from household and business customers is not collected on a national basis.

In England and Wales, capital investment in the industry in 1996/97 was £3.2bn, over 20% higher than the previous year in real terms. The investment programme, at 50% of turnover, continues at a high level of activity. Over 50% of investment in the period 1995/96 to 1999/2000 is required to comply with the industry's statutory obligations with regard to water quality and the environment.

6.1 Profit and loss accounts 1996/97 (£m) (CCA)

Water Service Company	Anglian	Dŵr Cymru	North-umbrian	North West	Severn Trent	South-ern	South West	Thames	Wessex	York-shire	TOTAL* Water* Supply Cos.	TOTAL* England & Wales
Turnover of appointed business	**688.6**	**425.0**	**306.5**	**838.0**	**919.1**	**387.4**	**241.6**	**976.8**	**242.6**	**544.0**	**673.4**	**6,243.1**
Operating costs	(427.7)	(301.4)	(199.8)	(548.8)	(580.5)	(292.1)	(132.3)	(638.0)	(132.5)	(356.3)	(464.5)	(4,073.9)
Operating income	0.9	0.0	0.7	(7.6)	2.5	2.4	0.0	10.9	(2.0)	0.4	(5.6)	2.6
Working capital adjustment	4.9	1.8	(0.8)	2.3	3.9	4.1	1.0	2.3	1.2	2.8	2.7	26.1
Operating profit	**266.7**	**125.4**	**106.6**	**284.0**	**345.0**	**101.8**	**110.4**	**352.0**	**109.3**	**190.9**	**195.1**	**"2,187.1**
Other income	1.8	1.4	0.0	3.3	0.0	1.1	0.3	0.0	0.4	1.2	5.5	15.0
Net interest	(59.5)	(21.9)	(18.0)	(86.2)	(35.1)	(41.0)	(11.3)	(44.5)	(19.6)	(23.4)	(35.3)	(395.8)
Financing adjustment	19.3	4.9	7.7	25.3	20.1	10.8	6.2	18.0	8.2	11.9	11.8	144.2
Profit before tax	**228.3**	**109.8**	**96.3**	**226.3**	**330.0**	**72.7**	**105.5**	**325.5**	**98.3**	**180.6**	**176.7**	**1,950.0**
Tax	0.0	(2.0)	(17.2)	(7.0)	(34.8)	0.0	(7.8)	(42.3)	(18.9)	(10.8)	(25.2)	(166.0)
Profit after tax	**228.3**	**107.8**	**79.1**	**219.3**	**295.2**	**72.7**	**97.7**	**283.2**	**79.4**	**169.8**	**130.3**	**1,762.9**

** totals exclude Cholderton figures*

Note: totals may not add due to rounding

Note: these are all current cost values and are not comparable with years before Waterfacts '96

Source: Water companies

6.2 Income by turnover category 1996/97 (£m)

	WATER SERVICES		SEWERAGE SERVICES		Trade		
	metered	unmetered	metered	unmetered	effluent	Other	TOTAL
Anglian	97.5	168.4	91.2	277.7	21.3	32.5	688.6
Dŵr Cymru	63.1	138.8	34.3	154.8	7.6	26.4	425
Northumbrian	45.1	97.8	34.0	120.0	6.4	3.2	306.5
North West	128.9	233.8	143.8	274.0	39.3	18.2	838.0
Severn Trent	144.4	229.4	142.4	333.5	43.4	26.0	919.1
Southern	40.1	76.1	56.2	197.2	7.1	10.7	387.4
South West	36.4	66.1	32.6	99.2	3.9	3.5	241.6
Thames	111.0	262.8	119.7	437.0	23.8	22.5	976.8
Wessex	31.2	46.6	35.5	116.6	5.6	7.1	242.6
Yorkshire	92.4	165.8	56.1	192.4	27.7	9.6	544.0
TOTAL WSCs	**790.1**	**1,485.5**	**745.8**	**2,202.4**	**186.1**	**159.7**	**5,569.7**
Water supply companies*	192.5	460.2	0.0	0.0	0.0	20.7	673.4
Industry TOTAL*	**982.6**	**1,945.7**	**745.8**	**2,202.4**	**186.1**	**180.4**	**6,243.1**

** Totals exclude Cholderton figures*

Note: totals may not add due to rounding

Source: Water companies

6.3 Operating costs by category 1996/97 (£m) (CCA)

	Anglian	Dŵr Cymru	North-umbrian	North West	Severn Trent	South-ern	South West	Thames	Wessex	York-shire	TOTAL WSCs	TOTAL[1] Water Sup. Cos	TOTAL[1] England & Wales
Manpower costs	68.1	48.0	36.9	41.0	117.3	38.3	23.0	124.9	22.3	62.0	581.8	47.7	629.5
Other costs employment	4.1	2.5	2.2	-	2.5	1.5	0.8	-	1.6	2.8	18.0	1.1	19.1
Power	25.9	16.4	8.2	19.5	33.3	12.3	9.5	40.3	8.2	21.0	194.6	23.9	218.6
Rates	29.1	16.8	11.4	39.9	38.7	12.0	8.2	43.9	6.7	25.5	232.2	22.6	254.7
Sewerage agencies	-	9.5	5.5	12.9	17.9	-	1.4	-	-	8.5	55.7	1.1	56.8
Materials & consumables	19.2	19.0	9.4	9.9	29.4	3.6	7.9	26.3	7.6	16.6	148.9	17.2	166.2
Hired & contracted services	63.1	24.7	22.6	14.6	46.9	6.3	21.1	151.8	13.6	47.8	412.5	23.0	435.5
Infrastructure renewals	17.7	24.1	18.6	78.2	61.0	18.4	6.5	38.4	10.2	33.1	306.2	32.0	338.2
Depreciation (CC)	145.3	87.7	56.5	174.7	148.4	102.6	39.3	161.9	48.8	103.2	1,068.4	58.4	1,126.8
Other	55.2	52.6	20.9	158.1	85.1	97.1	14.5	50.5	13.5	35.8	583.3	81.3	664.6
Total	**427.7**	**301.4**	**192.2**	**548.8**	**580.5**	**292.1**	**132.2**	**638.0**	**132.5**	**356.3**	**3,601.6**	**308.5**	**3,910.1**

Note: totals may not add due to rounding

[1] Totals exclude figures for Cholderton.

Source: Water companies

6.4 Capital expenditure by service 1996/97 (£m)

	Anglian	Dŵr Cymru	North-umbrian	North West	Severn Trent	South-ern	South West	Thames	Wessex	York-shire	TOTAL WSCs	TOTAL[1] Water Supply Cos.	TOTAL[1] England & Wales
Water resources	6.0	3.5	2.0	10.3	11.7	6.8	16.8	10.7	4.8	80.1	152.8	13.5	**166.3**
Water treatment	25.9	22.1	6.0	30.6	49.7	16.5	27.8	45.0	2.0	51.1	276.7	56.2	**332.9**
Water distribution	117.2	63.4	41.1	120.5	137.8	44.5	30.1	116.5	27.0	95.6	793.7	140.9	**934.6**
Water management	28.6	10.6	10.7	30.7	35.2	1.4	8.4	20.6	2.7	13.8	162.9	25.9	**188.8**
Sewerage	66.4	54.2	53.0	113.5	106.7	62.3	31.6	88.3	31.7	27.6	635.3	0.0	**635.3**
Sewage treatment	77.3	90.0	43.6	160.9	88.9	53.1	38.4	141.0	25.6	73.6	792.4	0.0	**792.4**
Sewage management	28.6	9.3	10.0	33.3	36.2	4.1	8.5	21.7	4.5	13.8	170.1	0.0	**170.1**
TOTAL	**350.1**	**253.0**	**166.4**	**499.9**	**466.2**	**188.7**	**161.7**	**443.8**	**98.3**	**355.7**	**2983.8**	**236.4**	**3220.2**

Note: Figures may not add due to rounding

[1] *Totals exclude figures for Cholderton*

Source: Water companies

6.5 Capital expenditure by service 1996/97 for water supply companies (£m)

	water resources	water treatment	water distribution	water management	TOTAL
Bournemouth & West Hampshire	0.0	4.4	2.9	1.4	**8.7**
Bristol	1.3	1.6	12.6	2.7	**18.2**
Cambridge	0.0	0.0	3.4	0.3	**3.8**
Chester	0.0	0.4	1.1	0.2	**1.6**
Cholderton	n/a	n/a	n/a	n/a	**n/a**
Essex & Suffolk	3.2	17.8	16.0	4.2	**41.2**
Folkestone & Dover	0.7	1.0	4.0	0.3	**6.0**
Hartlepool	0.1	0.0	0.9	0.4	**1.5**
Mid Kent	0.5	1.5	9.4	1.9	**13.3**
Mid Southern	0.2	0.4	12.8	0.4	**13.9**
North Surrey	0.1	5.8	6.4	0.8	**13.1**
Portsmouth	1.2	0.7	6.4	0.8	**9.0**
South East	0.6	3.0	15.9	1.0	**20.6**
South Staffordshire	1.3	3.0	12.2	3.6	**20.1**
Sutton & East Surrey	0.8	1.1	5.2	1.1	**8.2**
Tendring Hundred	0.3	0.1	2.8	0.2	**3.5**
Three Valleys	2.4	12.5	25.7	5.8	**46.5**
Wrexham	0.7	0.2	2.6	0.3	**3.8**
York	0.0	2.6	0.7	0.2	**3.5**
TOTAL	**13.5**	**56.2**	**140.9**	**25.9**	**236.4**

Note: totals may not add due to rounding.

Source: Water companies

6.6 Total capital expenditure 1991/92 to 1996/97 (£m)

	91/92	92/93	93/94	94/95	95/96	96/97	TOTAL
Water service companies							
Anglian	293.4	326.7	371.5	300.6	283.7	350.1	1,926.0
Dŵr Cymru	189.7	201.0	180.5	197.3	219.3	253.0	1,240.8
Northumbrian	104.5	110.0	70.1	79.0	103.0	166.4	633.0
North West	511.5	489.5	423.6	373.7	436.5	499.9	2,734.7
Severn Trent	577.5	539.6	434.2	374.7	365.4	466.2	2,757.6
Southern	162.1	114.7	152.2	157.1	139.8	188.7	914.6
South West	174.7	205.0	204.9	159.0	108.5	161.7	1,013.8
Thames	424.7	400.4	390.8	326.7	375.2	443.8	2,361.6
Wessex	137.8	130.2	115.1	91.0	87.8	98.3	660.2
Yorkshire	290.2	303.1	220.8	188.6	230.4	355.7	1,588.8
TOTAL WSCs	**2,866.1**	**2,820.2**	**2,563.7**	**2,247.7**	**2,349.6**	**2,983.8**	**15,831.1**
Water supply companies	**261.6**	**220.0**	**238.9**	**220.7**	**224.2**	**236.4**	**1,401.8**
TOTAL England & Wales	**3,127.7**	**3,040.2**	**2,802.6**	**2,468.4**	**2,573.8**	**3,220.2**	**17,232.9**
EA[1]	67.4	59.5	52.7	56.5	51.4	165.6	453.1
Scotland	171.1	230.4	262.0	259.9	238.2	225.7	1,387.3
Northern Ireland	51.4	64.6	82.0	97.1	102.9	76.3	474.3
UK	**3,417.6**	**3,394.7**	**3,199.3**	**2,881.9**	**2,966.3**	**3,687.8**	**19,547.6**

Note: All figures are at out-turn prices

[1]Figures before 1996/97 relate to the NRA

Source: Water companies, EA, Scottish Office, DoE (NI) Water Service

6.7 Ten year investment included in price limits (£m)

	average annual 1995/96 to 1999/00	capital expenditure 2000/01 to 2004/05
Water service companies		
Anglian	280	200
Dŵr Cymru	190	150
Northumbrian*	154	126
North West	460	290
Severn Trent	380	240
Southern	240	160
South West	100	80
Thames	420	320
Wessex	100	70
Yorkshire	300	200
TOTAL WSCs	**2,624**	**1,836**
Water supply companies		
Bournemouth & West Hampshire	7	4
Bristol	14	11
Cambridge	2	2
Chester	1	1
Essex & Suffolk	37	21
Folkestone & Dover	3	2
Hartlepool	1	1
Mid Kent	11	10
Mid Southern	15	12
North Surrey	10	5
Portsmouth	7	5
South East	21	19
South Staffordshire	13	7
Sutton & East Surrey	9	7
Tendring Hundred	3	3
Three Valleys	34	31
Wrexham	2	2
York	2	1
TOTAL water supply companies	**194**	**143**
Industry TOTAL		
· annual average	**2,818**	**1,979**
· five year total	**14,090**	**9,895**

Notes:

1 Totals may not add due to rounding.

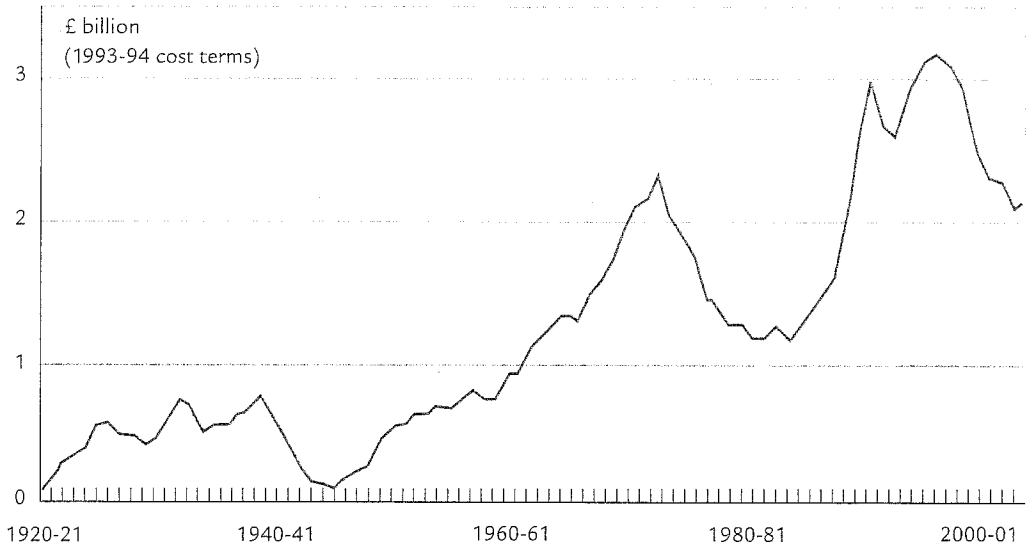
2 Figures are at 1993/94 prices and do not include any allowance for possible movements in capital expenditure prices relative to RPI.

3 Figures show expenditure allowed for by the Director General in making his determinations. It is for companies to determine how objectives are achieved, and the actual level and balance of expenditure required. In the case of South West Water and Portsmouth Water, the MMC allowed some extra investment in its determination but no adjustment has been made to the figures above.

** Figures include North East Water.*

Source: Ofwat

6.8 Capital expenditure



Notes:

1 The projected expenditure from 1995-96 is that allowed for in determining the price limits.

2 Figures are at 1993-94 cost terms. Actual expenditure in previous years has been repriced by RPI; future projections include an allowance for movements in capital expenditure prices relative to RPI.

Source: Ofwat

6.9 Total fixed assets at 31 March 1997 – net book values (£m) (CCA)

	Anglian	Dŵr Cymru	North-umbrian	North West	Severn Trent	South-ern	South West	Thames	Wessex	York-shire	TOTAL WSCs	TOTAL[1] Water Sup.Cos.	TOTAL[1]
Water Service													
Infrastructure assets	3,613.0	5,176.9	2,794.0	10,311.2	5,081.0	2,020.9	2,083.7	4,907.0	1,949.1	5,219.2	43,155.9	9,260.2	52,416.1
Operational assets	820.1	720.1	314.0	1,152.5	1,124.3	417.5	387.1	1,891.8	234.1	827.3	7,888.9	1,861.1	9,750.0
Other tangible assets	119.9	40.2	11.0	41.6	85.5	32.2	34.4	48.8	20.7	202.2	636.5	73.4	709.9
Sewerage service													
Infrastructure assets	8,560.4	5,765.5	4,347.0	18,790.6	16,713.7	8,577.8	2,364.0	26,500.8	5,547.6	7,680.0	104,847.4	-	104,847.4
Operational assets	1,366.7	980.0	480.0	2,008.6	1,859.8	1,003.8	619.7	2,219.3	624.8	966.8	12,129.5	-	12,129.5
Other tangible assets	68.5	32.3	9.0	116.8	64.6	67.6	34.5	65.7	21.4	273.3	753.8	-	753.8
TOTAL	**14,548.8**	**12,715.4**	**7,955.0**	**32,471.2**	**24,928.9**	**12,119.8**	**5,523.3**	**35,633.4**	**8,397.7**	**15,168.8**	**169,412.0**	**11,194.7**	**350,069.0**

Note: These are current cost values and are not therefore comparable with years before Waterfacts '96

Note: Totals may not add due to rounding

[1] Totals exclude figures for Cholderton

Source: Water Companies

6.10 Total fixed assets for Water Supply Companies at 31 March 1997 – net book values (£m) (CCA)

	Infrastructure assets	Operational assets	Other tangible assets	TOTAL
Bournemouth & West Hampshire	310.9	55.5	9.2	**375.6**
Bristol	1,134.0	176.6	2.037	**1,312.6**
Cambridge	183.2	22.5	5.2	**210.9**
Chester	73.2	18.5	0.9	**92.7**
Cholderton	n/a	n/a	n/a	**n/a**
Essex & Suffolk	1,214.4	325.6	16.9	**1,556.9**
Folkestone & Dover	147.0	20.5	0.8	**168.3**
Hartlepool	99.4	5.3	0.5	**105.2**
Mid Kent	462.4	156.7	11.2	**630.3**
Mid Southern	682.7	105.7	3.7	**792.2**
North Surrey	367.8	79.9	2.4	**450.1**
Portsmouth	356.4	61.6	1.6	**419.6**
South East	713.3	217.4	1.8	**932.5**
South Staffordshire	903.7	90.9	8.4	**1003.0**
Sutton & East Surrey	463.7	90.0	5.1	**558.8**
Tendring Hundred	150.2	32.0	0.4	**182.6**
Three Valleys	1,715.8	350.3	1.6	**2,067.6**
Wrexham	158.3	13.7	1.1	**173.1**
York	123.9	38.3	0.6	**162.7**
TOTAL	**9,260.2**	**1,861.1**	**73.4**	**11,194.7**

n/a = not available
Note: totals may not add due to rounding
Note: these are current cost values

Source: Water companies

6.11 Infrastructure improvements for the industry in England and Wales

	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97
Water mains – new, renewed or relined (km)	7,542	6,761	6,028	6,153	5,723	6,897
Sewers – new or renewed (km)	1,886	1,778	1,501	1,362	1,369	1,741
Number of communication pipes replaced	266,450	253,245	215,582	193,879	208,657	184,019
Sea outfalls abandoned	19	21	41	20	n/a	42
New sea outfalls commissioned	8	8	8	6	n/a	3

n/a = not available

Source: Water companies, Ofwat

6.12 Main assets 1996/97 – Water Service Companies

	Anglian	Dŵr Cymru	North-umbrian	North West	Severn Trent	Southern	South West	Thames
Sources								
reservoirs (impounding)	1	90	15	54	7	4	22	0
boreholes	144	71	45	134	172	117	38	124
river abstractions	12	68	8	50	14	12	32	14
Service reservoirs/ water towers	419	819	256	408	684	212	330	367
Water treatment works	157	120	64	149	194	107	46	98
Sewage treatment works								
preliminary/none	14	107	35	39	0	25	89	0
primary	68	208	102	150	10	23	110	3
secondary	654	517	277	422	684	203	375	244
tertiary	346	118	12	44	320	141	100	114
Total	1,082	950	426	655	1,014	392	674	361
Underground assets								
mains - km	33,799	26,109	16,324	40,403	41,590	13,168	15,067	31,280
sewers - km	32,366	16,499	13,748	32,719	52,065	22,095	8,904	77,626
Pumping stations								
sewage	3,815	1,414	546	1,552	2651	2,149	642	2,919
water	265	623	205	555	789	194	169	182
Storm overflows	1,090	1,794	1,402	2,168	2,028	679	1,171	452
Outfalls								
Long	11	14	4	9	0	13	13	0
Short	2	93	31	89	0	12	76	0
Total sea & estuarial outfalls	13	107	35	98	0	25	89	0

Continued on page 60...

6.12 Main assets 1996/97 – Water Service Companies *continued*

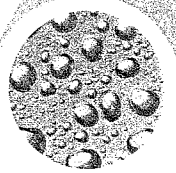
	Wessex	Yorkshire	TOTAL WSCs	TOTAL Water Supply Cos.[1]	TOTAL England & Wales	North Scotland[2]	East Scotland[2]	West Scotland[2]	Northern Ireland
Sources									
reservoirs (impounding)	12	106	311	17	**328**	134	53	121	51
boreholes	120	100	1,065	416	**1,481**	13	15	9	44
river abstractions	5	10	225	39	**264**	155	20	58	3
Service reservoirs/ water towers	344	430	4,269	503	**4,772**	714	268	341	502
Water treatment works	131	123	1,189	371	**1,560**	344	83	153	103
Sewage treatment works									
preliminary/none	15	10	334	-	**334**	18	11	0	-
primary	21	95	790	-	**790**	230	39	18	-
secondary	233	437	4,046	-	**4,046**	188	129	140	-
tertiary	91	88	1,374	-	**1,374**	34	12	16	-
Total	360	630	6,544	-	**6,544**	470	191	174	922
Underground assets									
mains - km	10,997	27,865	256,601	62,154	**318,755**	19,616	12,163	17,695	22,200
sewers - km	15,091	33,651	304,764	-	**304,764**	7,300	8,600	13,300	9,530
Pumping stations									
sewage	1,217	1,391	18,296	-	**18,296**	562	373	381	682
water	320	449	3,751	717	**4,468**	n/a	n/a	n/a	321
Storm overflows	**1,012**	**1,766**	**13,562**	-	**13,562**	**310**	**404**	**912**	-
Outfalls									
Long	7	4	75	-	**75**	21	9	n/a	-
Short	8	19	330	-	**330**	540	36	n/a	-
Total sea & estuarial outfalls	15	23	405	-	**405**	561	45	137	-

[1] *Totals do not include figures for Cholderton*

[2] *Data for Scotland is for 1995/96. This differs from data supplied in Waterfacts '96 which was estimated.*

Source: Water companies, Scottish Office, DoE (NI) Water Service

7 Manpower



The table reports the numbers of employees (in full time equivalents) directly employed in the regulated businesses. Over the period the water companies have made greater use of outsourcing to improve efficiency and these figures do not include the employees of contract service providers who are engaged in water industry work. In some cases, such as the multi-utility plcs, new facilities management companies have been formed to undertake support functions which has led to transfer of staff from the core business. Outsourcing includes not just support services such as accounting, property management, and information technology services but also the capital investment programme. Around 4-5% of employment in the construction industry, some 60,000 jobs, is directly related to work on water and sewerage projects.

7.1 Manpower

Full-time equivalent employees at March 31

	1991	1992	1993	1994	1995	1996	1997
Anglian	3,629	3,927	3,970	3,942	4,815[1]	4,281[1]	4,204[1]
Dŵr Cymru	3,455	3,505	3,437	3,352	3,329	3,172	2,350[3]
Northumbrian	1,193	1,222	1,317	1,370	1,377	1,850[2]	1,672[2]
North West	6,762	5,722	5,571	5,541	5,471	4,697	3,866
Severn Trent	7,054	7,456	7,000	6,757	6,531	5,862	5,653
Southern	2,259	2,226	2,428	2,453	2,371	2,243	1,961
South West	1,855	2,084	2,144	2,141	2,084	1,815	1,755
Thames	7,400	7,218	7,216	6,772	6,485	6,119	5,562
Wessex	1,755	1,821	1,871	1,771	1,582	1,431	1,396
Yorkshire	4,074	4,031	3,813	3,930	3,373	3,091	3,109
Total WSCs	**39,436**	**39,212**	**38,767**	**38,029**	**37,418**	**34,561**	**31,528**
Water Supply Companies	**7,000**	**7,101**	**6,356**	**6,576**	**6,232**	**5,331[2]**	**5,851[2]**
Scotland:	6,229	6,514	6,608	6,665	6,653	6,921	6,803
• North Scotland	-	-	-	-	-	1,940	1,947
• East Scotland	-	-	-	-	-	2,013	1,968
• West Scotland	-	-	-	-	-	2,968	2,888
Northern Ireland	2,598	2,633	2,533	2,463	2,418	2,308	2,260
UK	**55,263**	**55,460**	**54,264**	**53,733**	**52,721**	**49,121**	**46,442**

[1] Following restructuring of Anglian Water PLC, a large number of Group employees were moved to the water service company.

[2] Figures affected by merger of Northumbrian and North East Water

[3] The change from 1996 includes the transfer of 665 employees to a common services company within the Hyder Group.

Source: Water companies, Scottish Office, DoE (NI) Water Service

8 International

8.1 Abstractions of water according to source (million m^3)

	True ground water		Spring water		Surface water		TOTAL water abstraction	
	1980	1995	1980	1995	1980	1995	1980	1995
Austria	287	330	320	318	5	5	**612**	**653**
Belgium	435	490	0	0	217	248	**652**	**738**
Denmark	–	467	–	0	–	3	–	**470**
Finland	n/a	n/a	n/a	n/a	n/a	n/a	n/a	**n/a**
France	–	3,480	–	0	–	2,320	–	**5,800**
Germany	4,209	3,689	531	465	1,898	1,597	**6,638**	**5,751**
Hungary	297	652	60	95	443	49	**800**	**796**
Italy	3,290	4,080	2,535	3,145	892	892	**6,717**	**8,117**
Luxembourg	2	2	27	32	16	11	**45**	**45**
Netherlands	667	832	0	0	337	458	**1,004**	**1,290**
Norway	135	130	0	0	765	980	**900**	**1,110**
Spain	684	744	0	143	2,426	2,728	**3,110**	**3,615**
Sweden	239	234	0	0	716	703	**955**	**937**
Switzerland	449	447	473	445	181	176	**1,103**	**1,068**
UK	**1,910**	**1,960**	**0**	**0**	**5,060**	**5,678**	**6,970**	**7,638**

n/a = not available

Source: Statistics and Economics Committee IWSA September 1997

8.2 Water delivery (million m³)

	Household and small business		Industry and others		TOTAL delivery		Inhabitants (millions)		Supply rate %
	1980	1995	1980	1995	1980	1995	1980	1995	1995
Austria	365	415	225	215	**590**	**622**	7.55	8.06	87.2
Belgium	366	434	208	145	**574**	**579**	9.85	10.13	98.0
Denmark	285	261	166	125	**451**	**386**	5.13	5.23	94.0
Finland	n/a	n/a	n/a	n/a	**n/a**	**n/a**	n/a	n/a	n/a
France	2085	3260	1120	1180	**3205**	**4440**	53.88	57.40	99.0
Germany	3816	3972	2055	1086	**5871**	**5058**	78.27	80.50	98.5
Hungary	387	414	376	204	**763**	**618**	10.71	10.25	98.0
Italy	3945	4800	1295	1500	**5240**	**6300**	56.43	57.34	92.0
Luxembourg	24	26	10	12	**34**	**38**	0.36	0.41	99.5
Netherlands	733	985	192	186	**925**	**1171**	14.14	15.42	99.9
Norway	230	420	370	320	**600**	**740**	4.09	4.33	88.0
Spain	2146	1346	794	541	**2940**	**1887**	37.43	39.43	98.0
Sweden	516	534	298	197	**814**	**731**	8.31	8.84	87.0
Switzerland	532	611	380	308	**912**	**919**	6.37	7.06	99.9
UK	**3160**	–[1]	**2070**	–[1]	**5230**	**5926**	**56.31**	**58.61**	**99.4**

Note: Figures relate to public water supply

[1] *UK figures are only available for measured and unmeasured supplies. Although metered supplies account for the majority of Industry and Others, it also includes some small businesses and households.*

Source: Statistics and Economics Committee IWSA September 1997

8.3 Specific water consumption (litres/capita/day)

	Household and small business		Industry and others		TOTAL	
	1980	1995	1980	1995	1980	1995
Austria	155	162	100	81	**255**	**243**
Belgium	104	120	59	40	**163**	**160**
Denmark	165	145	96	70	**261**	**215**
Finland	n/a	n/a	n/a	n/a	**n/a**	**n/a**
France	109	156	58	56	**167**	**212**
Germany	137	132	74	36	**211**	**168**
Hungary	110	113	107	56	**217**	**169**
Italy	211	249	69	78	**280**	**327**
Luxembourg	183	169	76	81	**259**	**250**
Netherlands	142	175	37	35	**179**	**210**
Norway	154	260	247	220	**401**	**480**
Spain	157	–	58	–	**215**	**265**
Sweden	195	191	120	70	**315**	**261**
Switzerland	229	237	163	120	**392**	**357**
UK	**154**	–[1]	**100**	–[1]	**254**	**343**

[1] *UK figures are only available for measured and unmeasured supplies. Although metered supplies account for the majority of* ***Industry and Others****, it also includes some small businesses and households.*

Source: Statistics and Economics Committee IWSA September 1997

8.4 Comparison of annual water charges (200m³/year)

	Town/City	Annual charge (ECU)	GDP per capita (ECU)
Austria	Vienna	278.0	20,876
Belgium	Brussels	286.6	20,662
Denmark	Copenhagen	213.0	24,994
Finland	Helsinki	135.5	18,158
France	Paris	148.4	20,349
Germany	n/a	n/a	n/a
Hungary	Budapest	44.0	2,264
Italy	Rome	52.0	14,759
Luxembourg	Luxembourg	260.4	22,019
Netherlands	Amsterdam	190.5	19,108
Norway[1]	Oslo	64.4	25,876
Spain	Madrid	135.4	10,987
Sweden	Stockholm	137.4	21,904
Switzerland	Berne	194.6	32,460
UK	**London**	**124.9**	**14,100**

n/a = not available

Source: Statistics and Economics Committee IWSA September 1997

8.5 River Quality

Water Quality %

	Year of survey	Good	Fair	Poor	Bad
Austria	1991	14	82	3	1
Belgium	1989-90	17	31	15	37
Denmark	1989-91	4	49	35	12
England & Wales	1994	59	32	8	1
Germany[1]	1985	44	40	14	2
Ireland	1987-90	77	12	10	1
Italy	1992	27	31	34	8
Luxembourg	1991	53	19	17	11
Netherlands	1990	5	50	40	5
Northern Ireland	1990	72	24	4	0
Scotland	1990	97	2	1	0

[1] *Excludes former GDR.*

Source: Europe's Environment – The Dobris Assessment 1995, Scottish Office

8.6 Quality of bathing water 1990-96

COMPLIANCE WITH COLIFORM PARAMETERS OF EC DIRECTIVE

	Sea water							Fresh water						
	1990	1991	1992	1993	1994	1995	1996	1990	1991	1992	1993	1994	1995	1996
Belgium	90	85	90	82	92	97	97	86	75	58	59	56	52	85
Denmark	–	93	95	96	95	96	97	–	90	92	95	96	93	95
Finland	–	–	–	–	–	–	89	–	–	–	–	–	–	89
Germany	–	64	74	76	80	85	82	–	37	39	45	47	53	61
Greece	65	90	97	96	95	98	98	–	33	100	100	100	75	75
Spain	–	88	93	95	96	97	97	–	48	61	65	64	68	65
France	–	87	78	83	87	88	83	–	84	80	84	82	88	68
Ireland	–	97	94	96	100	98	96	–	–	100	100	100	100	100
Italy	–	90	92	88	86	92	92	–	87	79	81	87	89	89
Luxembourg	–	–	–	–	–	–	–	75	50	75	80	85	85	85
Netherlands	82	86	86	80	64	65	85	–	–	75	62	45	50	54
Portugal	87	86	83	81	83	92	86	–	–	–	29	71	50	35
Sweden	–	–	–	–	–	–	63	–	–	–	–	–	–	63
UK	77	76	79	80	82	89	89	–	–	–	–	–	–	–

Source: European Commission: Quality of Bathing Water (1996 Bathing Season)

8.7 Bathing water quality in EC member states 1996

	Number of sampling points	% of sampling points not sampled or insuffiently sampled	% complying with mandatory values
Sea			
Belgium	39	0.0	97.4
Denmark	1,196	0.2	97.4
Finland	101	10.9	63.3
Germany	430	4.4	82.1
Greece	1,690	0.2	98.6
Spain	1,572	0.4	96.7
France	1,846	12.4	83.0
Ireland	115	0.0	95.7
Italy	4,688	1.2	92.4
Netherlands	48	4.2	85.4
Portugal	339	1.2	86.4
Sweden	392	34.7	63.3
UK	472	0.0	89.4
Fresh			
Belgium	55	1.8	85.5
Denmark	113	1.8	94.7
Finland	391	11.0	88.7
Germany	1,822	27.8	60.9
Greece	4	0.0	75.0
Spain	302	2.6	64.6
France	1,648	23.3	67.8
Ireland	9	0.0	100.0
Italy	697	1.1	89.5
Luxembourg	20	0.0	85.0
Netherlands	543	32.4	53.6
Sweden	487	29.0	70.4
Portugal	26	7.7	34.6

Source: European Commission: Quality of Bathing Water (1996 bathing season)

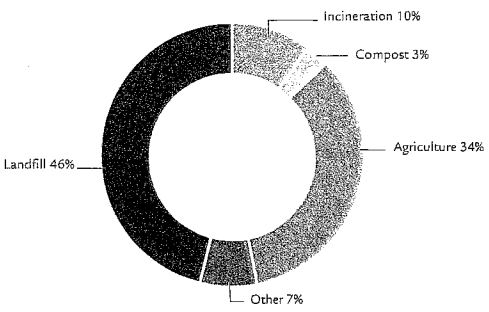
8.8 Sewage sludge (biosolids) generation

	Quantity in dry solids/tonnes/per annum	
	Current (1994)	After UWWT Directive
Austria	180,000	250,000
Belgium	88,000	250,000
Denmark	170,000	170,000
Finland	150,000	150,000
France	800,000	1,300,000
Germany	3,200,000	3,850,000
Greece	70,000	180,000
Ireland	12,000	40,000
Italy	800,000	1,300,000
Luxembourg	7,500	15,000
Netherlands	340,000	450,000
(Norway)	(93,000)	(130,000)
Portugal	8,400	60,000
Spain	528,000	1,088,000
Sweden	240,000	240,000
UK	1,100,000	1,350,000
Total EU	**7,693,900**	**10,693,000**

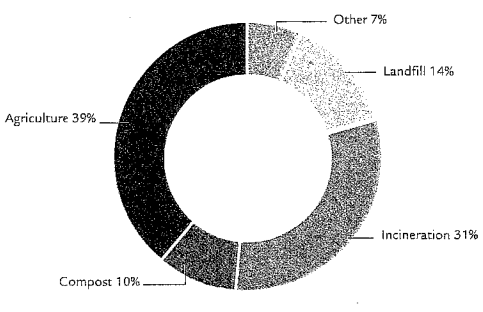
Source: European Waste Water Group

8.9 Sludge Outlets

Average for ten member states at 31.12.94



Estimated average after implementation of the Urban Waste Water Treatment Directive



Notes:
Agriculture includes forestry, landfill includes land reclamation, other includes sea disposal and wet oxidation

Source: European Waste Water Catalogue 1997

8.10 Resident inhabitants connected to sewers as a percentage of resident population. Total capital cost of planned new and renovated collection systems (including pumping stations) from 1995 to 2005.

Country	Sewer connections %	Total capital cost (millions ECU*)
Finland	78	1,755
France	51	13,000
Germany	92	60,000
Greece	58	640
Italy	82	12,000
Luxembourg	99	775
Netherlands	97	3,000
Portugal	57	1,460
Spain	82	4,700
UK	96	4,000

** 1994 rate*

Source: European Waste Water Catalogue 1997

9 Other water organisations

BOARD FOR EDUCATION AND TRAINING IN THE WATER INDUSTRY (BETWI)

1 Queen Anne's Gate, London, SW1H 9BT
Tel: 0171 957 4524 • Fax: 0171 957 4557

BETWI is the national training organisation (NTO) for the water sector. As an NTO it provides a focal point for all education and training matters within the water sector and is the principal point of contact with the Department for Education and Employment. As an NTO, BETWI has four primary roles:

- monitoring the future skill requirements and training in the water industry sector
- developing and promoting occupational standards and vocational qualifications
- encouraging employers in the industry to improve their training effort and
- promoting government education and training initiatives within the sector and acting as a link between government bodies and sector organisations.

Incorporation as a company limited by guarantee took place on 14 October 1992. Membership consists of the Water Services Association of England and Wales, Water Companies Association, DoE (NI) Water Service and the Scottish Water Authorities.

BRITISH WATER

1 Queen Anne's Gate, London SW1H 9BT
Tel: 0171 957 4554 • Fax: 0171 957 4565

British Water is the lead trade association for the UK water and waste water industry worldwide. It aims to promote the development of markets for British goods, services and technical expertise in the water industry at home and overseas.

Membership is approaching 200 companies ranging from small and medium-sized enterprises to major international corporations. In addition to the water service companies, membership is drawn from computing, engineering and management consultants; civil and process contractors; equipment manufacturers and suppliers; financial institutions; law firms, and specialist research and training organisations.

Services provided for members are designed to support their own business development activities and include market support programmes in UK and international markets; representing members' interests to Government, Whitehall and Brussels on legislative and regulatory issues affecting the industry; monitoring technical developments and developing appropriate action programmes; the development and publication of codes of practice and technical documentation, and organising overseas trade missions, seminars and exhibitions; publication of industry statistics.

THE CERTIFICATION AND ASSESSMENT BOARD FOR THE WATER INDUSTRY (CABWI)

1, Queen Anne's Gate, London SW1H 9BT
Tel: 0171 957 4517 • Fax: 0171 957 4641

CABWI is the awarding and certification body for the water industry's National Vocational Qualifications (NVQs) in England, Wales and Northern Ireland.

For the workforce in Scotland, there is a joint certification agreement, between the Scottish Qualifications Authority (SQA) and CABWI to award joint certificates and units of accreditation in the form of Scottish Vocational Qualifications (SVQs).

CABWI is also an awarding body, alongside City & Guilds and SQA, for the Street Works qualifications for Supervisors and Operatives contained in the two sets of Regulations which cover England, Wales and Scotland, under the New Road and Street Works Act 1991, and for the new Act which covers Northern Ireland.

Incorporated as a company limited by guarantee on 12 August 1991, membership consists of the Water Services Association of England and Wales, Water Companies' Association, DoE (NI) Water Service and the Scottish Water Authorities.

THE CHARTERED INSTITUTION OF WATER AND ENVIRONMENTAL MANAGEMENT (CIWEM)

15 John Street, London WC1N 2EB
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CIWEM is a multi-disciplinary, professional and examining body for engineers, scientists and other professionally qualified personnel engaged in water and environmental management. The main objectives of the institution are to advance the practice of water and environmental management for the public benefit and to promote education, training, study and research in those areas. CIWEM's membership is nearly 12,000 of whom over 1,500 are overseas.

FOUNDATION FOR WATER RESEARCH (FWR)

Allen House, The Listons, Liston Road, Marlow,
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e-mail: fwr_marlow@compuserve.com
Home page: http://www.atlas.co.uk/listons/

FWR is an independent, non-profit making, membership-based (UK and overseas) organisation. It promotes sound scientific research on issues of common concern through direct funding/added value, management of jointly sponsored projects and the dissemination/publication of research results.

- FWR funds and manages research
- FWR co-ordinates and funds research forums
- FWR provides information and facilitates technology transfer globally.

INSTITUTE OF HYDROLOGY (IH)

Maclean Building, Crowmarsh Gifford,
Wallingford OX10 8BB
Tel: 01491 838 800 • Fax: 01491 692424
e-mail: n.runnalls@ioh.ac.uk.

IH is one of the component institutes of the Natural Environment Research Council. Besides a central laboratory at Wallingford, it has research staff at Plynlimon, mid-Wales, at Stirling, Scotland and at several overseas locations. It has a turnover exceeding £7 million per year and a staff of over 180. Its mission is to obtain a greater understanding of the hydrological cycle and the component physical, chemical and biological processes at local, regional and global scales. Much of its research is directed toward monitoring and predicting the effects of natural environmental change and the activities of man on the hydrological cycle.

A core programme of research is funded by NERC but about 75% of IH work involves contract research for UK government departments, international agencies, overseas governments, consultants and public and private sector businesses.

INSTITUTION OF WATER OFFICERS (IWO)

Heriot House, 12 Summerhill Terrace,
Newcastle upon Tyne NE4 6EB
Tel: 0191 230 5150 • Fax: 0191 230 2880

The Institution of Water Officers is a professional membership organisation for people working in the water industry. Its purpose is to promote the advancement of knowledge which it does through local and national meetings, seminars, workshops, weekend schools, technical visits, exhibitions and a variety of social events. It is also a nominated body of the Engineering Council allowing it to register members at both Eng Tech and I Eng level.

The Institution produces a quarterly journal *Water* distributed throughout the water industry featuring articles on topical issues, products and services as well as Institution and industry news.

SOCIETY OF BRITISH WATER INDUSTRIES

38 Holly Walk, Leamington Spa, Warwicks, CV32 4LY
Tel: 01926 831 530 • Fax: 01926 831 931

SBWI serves the interests of the major UK manufacturers and contractors who supply the Water Industry. Members meet regularly in Sections devoted to specific interests: pipeline equipment; metering systems; wastewater; contracting (from service laying to turnkey projects).

The main aim of the Society is to help members serve the water industry better, by keeping them well informed about topical issues, providing seminars and speakers when required, and liaising with other bodies. Members are also represented on European, British and Industry standards-making committees.

UK WATER INDUSTRY RESEARCH LIMITED (UKWIR)

1 Queen Anne's Gate, London SW1H 9BT
Tel: 0171 957 4521/4507 • Fax: 0171 957 4559
e-mail: UKWIR@compuserve.com

UKWIR provides a framework for the procurement of a common research programme for UK water operators on 'one voice' issues. Its members are the Water Services Association, the Water Companies Association, the Scottish Water Authorities and the DoE (NI) Water Service.

Since 1 April 1994, the members of UKWIR have collaborated in an 'operators' club' to carry out a rolling programme valued at about £3.5 million per year. On some projects the value is enhanced by collaborating either nationally with government departments and regulators or internationally with bodies such as the American Water Works Association Research Foundation.

Proposals for research and development projects are initiated by the water industry committees, consisting of representatives from the companies and authorities who are the members of UKWIR. The majority of the work contained in the programme is put out to open tender with tenders being sought from a wide range of companies, academic institutions and other organisations both in the UK and overseas. Individual projects are managed by project managers drawn from among the industry's research and development managers with central coordination.

In preparation for developing future programmes tailored to meet strategic business needs, UKWIR is holding a series of technology transfer workshops. A quarterly newsletter *UKWIR News* is published to promote the dissemination of current and future research information.

The research programme falls within the following main subject areas: Water Quality and Health; Toxicology, Water Resources; Waste Water Treatment; Sewage Sludge and Water Mains and Services and Sewerage. The programme also includes work on the coordination of water industry standards and environmental issues both in the UK and Europe.

WATERAID

Prince Consort House, 27-29 Albert Embankment,
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Tel: 0171 793 4500 • Fax: 0171 793 4545

Charity Registration Number 288701

Across the world over one billion people do not have access to safe water. Two billion people do not have access to effective sanitation. It is a shocking fact that 25,000 children die every day from water-related diseases.

WaterAid is the UK's only development agency specialising in water and sanitation. It works in partnership with local communities and organisations to help some of the poorest people in Africa and Asia to gain access to life's most precious resource - safe water. Created in 1981 by the men and women of the British water industry, WaterAid is an independent charity.

All projects supported by WaterAid use simple and practical technologies that are low in cost and easy to use and maintain. Local people take the lead in planning, building, managing and maintaining their new water supply and sanitation systems, whether a tap stand, hand-dug well or simple pit latrine. The inclusion of hygiene education in every project enables thousands of men, women and children to make lasting improvements to their quality of life.

WaterAid's vision is of a world in which everyone has access to safe water and effective sanitation. Work is currently in hand in 13 countries in the developing world to help turn this vision into a reality. To date nearly four and a half million people have benefited from WaterAid-funded projects. In addition over one and a half million people will have safe water and sanitation from projects already planned and under way. With the continued support of the water industry, even more people can look forward to a happier, healthier future.

WRc PLC

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Tel: 01491 571 531 • Fax: 01491 579 094
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WRc is an R&D and consultancy company specialising in the fields of water, wastewater and environmental management. It employs over 400 staff and current turnover is £20m.

WRc is a knowledge based organisation specialising in producing solutions to water, waste and environmental issues. It is an independent company operating from two major science and technology centres at Medmenham and Swindon.

WRc plc, Frankland Road, Blagrove, Swindon,
Wiltshire, SN5 8YF
Tel: 01793 511 711 • Fax: 01793 511 712

WRc also maintains an office in Scotland and overseas operations in the United States, Hong Kong, Brussels and Italy.

The WRc Evaluation and Testing Centre, at Oakdale, Wales, evaluates consumer products for suitability. Its address is:
WRc Evaluation and Testing Centre, Fern Close,
Pen Y Fan Industrial Estate, Oakdale, Gwent NP1 4EH
Tel: 01495 248454 • Fax: 01495 249234

WTI

Tadley Court, Tadley, Hampshire RG26 3TB
Tel: 0118 981 3011 • Fax: 0118 981 7000

WTI Training Group's Water & Environment division is the largest supplier of operations, engineering and scientific training to the UK water and environment sector. In addition to the provision of open and customised courses and consultancy, we run special schemes and manage outsource training centres on behalf of our clients.

A wide range of training services is now available through eight other service divisions:

- building and facilities management
- gas
- health and safety
- international
- mechanical and electrical
- people development
- street works
- trackside training

Each year around 6,000 people attend courses in our centres and we train more than 10,000 delegates on-site. Our client list is more than 2,000 strong.

WTI works with industry bodies on the development of training and qualification schemes and many courses are endorsed by national bodies including City & Guilds, BTEC, CABWI, CIWEM and IWO.

EUROPEAN AND INTERNATIONAL ORGANISATIONS

EUREAU

Chausée de Waterloo 255-bte 6, 1060 Brussels, Belgium
Tel: 00 32 2 534 55 90 • Fax: 00 32 2 534 10 62
e-mail: eureau@skymet.be

Eureau is a non-profit organisation representing the interests of water suppliers within the European Union. It has the following objectives:

- to represent the common interests of its members to the public or private community organisations responsible for dealing with the formulation of community legislation and European standards relevant to water supply and waste water
- to identify, propose, encourage and take all necessary steps in the context of the general interests of the water sector
- to make the appropriate international and national bodies and the general public aware of the relevant issues
- The European Union and European Free Trade Association countries are full members. The UK is represented by the Water Services Association. Other European countries can apply to be observer members.

From 1 January 1998 onwards, EUREAU and EWWG will merge and the name of the new association will be the European Union of National Associations of Water Suppliers and Waste Water Services or EUREAU. The Committee structure (requiring two UK representatives to be appointed to each Commission will be:

- **Commission 1**
  Drinking water: resources, treatment and quality
- **Commission 2**
  Waste water: technical and economic aspects
- **Commission 3**
  Drinking water: legislation and economics
- **Commission 4**
  Drinking water and waste water: standardisation and certification

EUROPEAN WASTE WATER GROUP (EWWG)

1 Queen Anne's Gate, London, SW1H 9BT
Tel: 0171 957 4522 • Fax: 0171 957 4666

EWWG is an alliance of wastewater operators which seeks an integrated approach throughout the European Union to the problems of waste water and sludge, recognising the search for achievable and affordable solutions and the need for an exchange of views between operators and the Commission and other Institutions in the Union. It was set up in 1991 and now has members and associates in all member states. France has the Presidency and WSA currently provides the Secretariat.

The EWWG Secretariat transferred from WSA to EUREAU Headquarters in Brussels on 1 January 1997 prior to the merger of EWWG with EUREAU on 1 January 1998 to form one European trade association for the water and waste water industry. The EWWG has a Technical and Economic Committee which will become Commission 2 of EUREAU upon the merger in 1998.

EUROPEAN WATER POLLUTION CONTROL ASSOCIATION

Theodor-Heuss-Allee 17, D-53773 Hennef/Sieg, Germany
Tel: 00 49 22 42 8 72 0 • Fax: 00 49 22 42 8 72135

Established in 1981 as a non-governmental organisation registered in Bonn. Activities are aimed at advancing knowledge in water protection and in furthering interaction and collaboration between countries in the technical and scientific practice of water management. Its membership is mainly professional bodies. The UK member is CIWEM.

INTERNATIONAL ASSOCIATION ON WATER QUALITY (IAWQ)

Duchess House, 20 Mason's Yard, Duke Street,
St James's, London SW1Y 6BU
Tel: 0171 839 8390 • Fax: 0171 839 8299.
e-mail: IAWQ@compuserve.com
WWW: http://www.iawq.org.uk

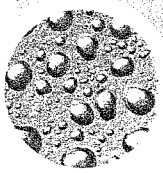
The association is set up to promote the professional advancement of the science and practice of water quality management. There is a UK committee which has two Water Services Association representatives.

INTERNATIONAL WATER SERVICES ASSOCIATION (IWSA)

1 Queen Anne's Gate, London SW1H 9BT
Tel: 0171 957 4567 • Fax: 0171 222 7243

The International Water Services Association (formerly the International Water Supply Association) was formed in 1947. Seventy three countries are in full corporate membership and about 800 associate and individual members in 100 countries participate in its activities which are aimed at improving knowledge of public water supplies and promoting the exchange of information among all those with responsibility for and interest in water supply. There is a British Committee which has representatives from each of the water service companies as well as other UK bodies.

Glossary of terms



Additional terms frequently encountered in relation to water and sewerage, not defined previously in Waterfacts '97.

ABSTRACTION

Taking of water from river, reservoir or borehole. Abstractions of surface water and groundwater in England and Wales are subject to an Environment Agency licence. Licence holders include water undertakers, general industry (particularly electricity generating companies) and agricultural concerns.

AQUIFER

Underground water source – water bearing rock and soil strata.

BATHING WATERS

Areas designated under EC directive 76/160/EEC. Number of bathers is main criterion.

BIOCHEMICAL OXYGEN DEMAND (BOD)

The quantity of dissolved oxygen in water (mg/l) consumed under test conditions during a given period (5 days) through the microbiological oxidation of biodegradable organic matter present in waste waters. One of the standard tests used to characterise effluent quality.

BIODEGRADABILITY

Ability of substance to decompose without adding chemicals.

BIOLOGICAL FILTRATION

A process in which settled sewage uniformly trickles downward through a bed of inert material such as slag, moulded plastics or clinker, thus permitting contact with the biological film with which the surfaces of the medium are coated so that oxidation and clarification take place.

BLUE FLAG BEACHES

Beaches which meet a number of detailed criteria for cleanliness and facilities including compliance with the EC directive's guideline bathing water standards.

CATCHMENT

Area drained by a river or river system. Also area drained by a sewerage system.

CESS PIT

A holding tank for wastewater storage which is emptied on a regular basis. No treatment of the wastewater occurs in the cess pit. Used by outlying properties remote from the mains sewerage systems.

COARSE SCREEN

A screen used for removing gross solids from domestic or industrial wastewater, with spaces between the bars at least 50mm wide.

CHEMICAL OXYGEN DEMAND (COD)

The quantity of oxygen equivalent to the amount of oxidising agent consumed in oxidising the majority of organic matter present in waste waters. Does not distinguish between the organic matter liable to be degraded readily by biological means and the more intractable forms. Can include the oxygen demand of some inorganic substances such as sulphides. Measured by testing a sample of the wastewater with potassium dichromate and sulphuric acid.

CHLORINATION

The application of chlorine to water for the purpose of disinfection.

COASTAL WATERS (UNITED KINGDOM)

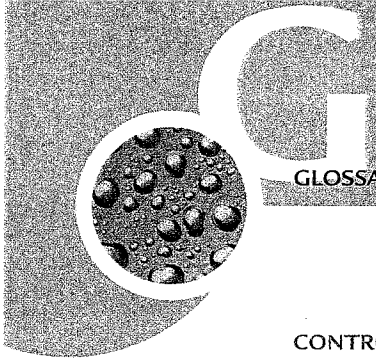
Defined in the Water Act 1989 as any waters which are within the area which extends landwards from baselines from which the breadth of the territorial sea is measured as far as the limit of the highest tide and in the case of any rivers, as far as tidal limit of the river.

COLIFORM BACTERIA

A group of bacteria found in the intestine and faeces of most animals. Coliforms can sometimes be found in untreated water. The treatment process removes them and disinfection prevents their reappearance in the distribution system. In water receiving discharges, faecal coliform bacteria are used to indicate the presence of sewage.

COMMUNICATION PIPE

That part of the pipe which conveys water from the main to the customer's house and which is in the road or footpath.



CONTROLLED WATERS
Inland, coastal, territorial and ground water to which British pollution control legislation applies.

CRYPTOSPORIDIUM
A waterborne parasitic micro-organism, believed to originate from livestock. Cryptosporidia have been identified as responsible for a small number of acute diarrhoea cases (cryptosporidiosis).

DESALINATION
The removal of dissolved salts from water by distillation, reverse osmosis, de-ionization, electrodialysis or freezing.

DISCHARGE CONSENT
A legal document which gives permission to discharge and sets out the terms under which the discharge should be made.

DISCONNECTION
Separation of a customer's supply from the public water network.

DESCRIPTIVE CONSENT
A consent under which discharges are controlled by imposing general rather than numerical standards.

DISINFECTION
The destruction of pathogens by physical or chemical means.

DISINFECTION BY-PRODUCTS (DBPs)
The residual substances formed by disinfection.

DISSOLVED AIR FLOTATION
A process which can be used for grease removal, for concentrating activated sludge, or a pre treatment stage in physico-chemical methods of treatment.

DISSOLVED OXYGEN (DO)
Oxygen dissolved in a liquid, the solubility depending on temperature, partial pressure, and salinity, expressed in milligrams per litre. Tables giving values for the solubility of oxygen in water have been published in standard methods.

DROUGHT
A prolonged period of dry weather; said to exist if, for at least fifteen days, on each day rainfall has been less than 0.25mm.

E. COLI (ESCHERICHIA COLI)
A bacterium taken as an indicator of faecal contamination.

ECOLOGY
The study of interrelation between living organisms and their environment.

ENVIRONMENTAL QUALITY OBJECTIVE (EQO)
The description of water quality required to maintain an identified use of a body of water.

ENVIRONMENTAL QUALITY STANDARD (EQS)
The concentration of a parameter which must not be exceeded if the EQO is to be maintained or achieved.

ESTUARY (UK)
The transitional area at the mouth of a river between fresh water and coastal waters.

ESTUARY (EC)
The transitional area between freshwater and the proper marine area. The outer part of an estuary is limited by the straight line between the furthest seawater extent of the low water line on each side of the estuary.

EUTROPHICATION
The enrichment of water by nutrients, especially compounds of nitrogen and/or phosphorus, causing an accelerated growth of algae and higher forms of plant life to produce disturbance to the balance of organisms present in the water and to the quality of the water concerned.

FINAL EFFLUENT
Typically, the effluent discharged from a treatment plant after completion of treatment of a domestic or industrial wastewater.

FINE SCREEN
A bar screen or wire mesh.

FLUORIDATION
Application of fluoride to drinking water at the request of health authorities as a preventive measure against dental decay.

FOUL FLOODING
Flooding from a sewer.

FOUL SEWER
A sewer conveying sewage, ie wastewater of domestic or industrial origin, excluding rain water or surface water.

GROUNDWATER
Water occurring in permeable underground strata eg chalk and sand stone.

HARDNESS
Characteristic of waters containing dissolved calcium and magnesium salts.

HYDROLOGY
The applied science concerned with the cycle, or precipitation, run-off or infiltration and storage, evaporation and re-precipitation.

IMPOUNDING RESERVOIR
The traditional form of upland reservoir produced by damming water courses.

INDUSTRIAL WASTE WATER
Any wastewater which is discharged from trade or industrial premises, other than domestic waste water and run-off rain water.

INTEGRATED POLLUTION CONTROL (IPC)
The control of discharges from specified industrial premises, whether to land, air or water.

K FACTOR
Amount by which each licensed water company can increase its charges annually on top of inflation. Controlled by Ofwat.

LESS SENSITIVE AREAS
A water body or area where the discharge of wastewater does not adversely affect the environment.
(See Annex II of UWWTD 91/271/EEC).
In the UK, also referred to as High Natural Dispersal Areas (HNDAs).

LICENCE OF APPOINTMENT
Legal document granting water company permission to operate.

LOAD
The quantity or mass of any substance transported in an effluent per unit time (the product of concentration of pollutant and effluent flow).

MAINS
Pipes which carry treated drinking water.

METER
A device for measuring length, flow, time, temperature of water.

NUMERIC CONSENT
A consent in which numerical limits are set for the concentration or load of substances discharged and also for the effluent flow.

NUTRIENTS
A substance such as nitrogen or phosphorus which provides nourishment to organisms.

OUTFALL
The site of discharge of a liquid from a pipe. Applied particularly to the point at which a sewer discharges to a treatment works or receiving water, or the point at which a conduit discharges the effluent from a treatment works into a receiving water.

OZONATION
The addition of ozone, particularly to a raw water or biologically treated sewage to decolorise and disinfect it. Also termed 'ozonization'.

PATHOGEN
A organism which is capable of producing disease.

PCBS
Polychlorinated Biphenyls – a group of industrial chemicals found in the environment.

PHENOLS
A group of aromatic organic compounds which may adversely affect biological sewage-treatment processes or sludge digestion, or cause taste problems in drinking water.

PLUMBO-SOLVENCY
The ability to dissolve lead.

POLLUTING LOAD
The quantity of polluting matter entering a treatment plant or in the effluent discharged into a receiving water during a given period.

POPULATION EQUIVALENT (PE)
The amount of oxygen demanding materials discharged by one person each day.

PRIVATE SEWER
A sewer which is not a public sewer as defined in section 20 of the Public Health Act 1936.

PUBLIC SEWER
A sewer vested in a water authority by virtue of the provisions of section 20 of the Public Health Act 1936 as amended by section 40 and paragraph 33 of the 8th schedule to the Water Act 1973.

RECEIVING WATER
Inland and coastal water receiving treated effluent to which pollution control legislation applies generally.

RED LIST
List of potentially dangerous substances whose discharge to watercourses is controlled under integrated pollution control.

SCREENINGS
The gross solids including rags and plastics in sewage are intercepted by screens and removed manually or by raking mechanisms.

SEDIMENTATION
The process by which settleable solids are removed from sewage by passing it through a tank at a rate that allows the solids to gravitate to the floor to form sludge.

SENSITIVE AREAS
A water body or area where more than secondary treatment is required for waste waters discharged under UWWTD 91/271/EEC.

SEPTIC TANK
A type of sedimentation tank in which the sludge is retained sufficiently long for the organic content to undergo anaerobic digestion. When sludge is eventually removed to a sewage treatment works, some is left in the tank to act as a 'seed' to initiate further digestion. Used for receiving the sewage from houses and other premises which are too isolated for connection to a foul sewer.

SERVICE RESERVOIR
A reservoir where treated water is stored.

SEWAGE (OR WASTE WATER)
Water-borne wastes from domestic uses of water, derived from households or similar uses in trade and industry. Storm sewage is that flowing to a treatment works in wet weather or discharged from storm overflows, when the sewage is diluted to a greater or lesser extent with rain water.

SEWAGE SLUDGE (ALSO KNOWN AS BIOSOLIDS OR SLUDGE)
A by-product arising from the treatment of sewage or from septic tanks or similar installations. (See Article II of Directive 86/278/EEC for full definition.)

SEWAGE (TREATMENT) WORKS (STW)
A term for the structures, plant and equipment used for collecting and treating sewage, normally with some sludge drying.

SEWER
A pipe conveying wastewater or sewage discharged into it from two or more house drains.

SEWERAGE
A system of pipes and mechanical appliances for the collection and transportation of domestic and industrial wastewaters.

SLUDGE CAKE
Sludge that has been dewatered to the extent that it can be handled as a solid, usually containing more than 15 per cent dry solids, depending on the type of sludge and method of dewatering.

SOFT WATER
Water which forms an immediate lather with soap and has a total hardness which is typically less than 60 milligrams per litre (as CaC03).

STATUTORY WATER COMPANY
A company authorised immediately before the passing of the Water Act 1973 by any local statutory provision to supply water, or a company in whom the assets of any company so authorised have subsequently become vested.

STATUTORY WATER QUALITY OBJECTIVE (SWQO)
Water Quality Objective set down in legislation.

STORAGE RESERVOIR
A reservoir for storing untreated water.

STORM SEWAGE OVERFLOW
A device to prevent overloading of the sewerage system during storm events.

STORM SEWAGE TANK
A tank into which, in wet weather, is diverted all the sewage and rain water reaching a treatment works in excess of that which is to receive biological treatment. Its purpose is to store as much of the storm sewage as possible, for return to the works inlet after the flow has returned to normal, and to remove settleable solids from the remainder which overflows from the tank to a receiving water.

STREPTOCOCCI
Bacterial indicator of faecal contamination of water.

SUPPLY PIPE
That portion of pipe which conveys water from the main to the customer's house and which is on the customer's property.

SURFACE WATER
The run-off from paved and unpaved roads, buildings and land.

SUSPENDED SOLIDS
In sewage analysis, those solids retained after filtration.

THM
Trihalomethanes: by-products of chlorination.

TOTAL DISSOLVED SOLIDS (TDS)
The concentration of dissolved solids in a wastewater or effluent, ie the residue after evaporation and drying, expressed in milligrams per litre of sample.

TRADE EFFLUENT
Wastewater produced by trade and industry – not domestic sewage.

TRANSFER (WATER)
System where drinking water or raw water is moved around a region.

TRUNK SEWER
A sewer which receives many tributary branches or discharges from other large sewers and serves a large area.

TURBIDITY
Interference with the passage of light rays through a liquid, caused by the presence of suspended matter.

ULTRAVIOLET (UV) TREATMENT
Treatment of drinking water or effluent with UV rays to neutralise bacteria.

UPPER TIER LIMIT
An absolute numerical limit in a consent to discharge.

WATER TABLE
Upper surface of the saturated zone in the ground.

WATER TREATMENT
The process of converting raw untreated water to a public water supply safe for human consumption. Can involve, variously, screening, initial disinfection, clarification, filtration, pH correction, final disinfection.

WATER (TREATMENT) WORKS (WTW)
Works which treat raw water to produce potable water for public supply.