

Wastes

Water that our customers have used in toilets, washing machines and baths in their homes or workplaces, becomes wastewater on entering our sewerage system. Following treatment at our wastewater treatment works we return the water to the environment via rivers or into the sea. We work to control the impact of these discharges on the environment.

Background

- We maintain 369 wastewater treatment works
- A population of 4,506,290 is connected to our sewerage system
- Our sewerage system extends to 21,243km
- Our wastewater operating expenditure for 2003-2004 was £110 million
- We processed 112,586 tonnes dry solids of sewage sludge in 2003-2004
- Our wastewater treatment sites return about 800 million litres of treated wastewater to the environment every day.

Biosolids are one of the by-products of wastewater treatment. We put biosolids through a series of treatment processes before recycling it as a soil conditioner and fertiliser. Biosolids treatment produces a flammable gas (known as biogas) that we use as a fuel.

For more information
See the *Energy and Atmosphere* section of this report at www.southernwater.co.uk/sustainability

We also produce other waste that we reuse, recycle or dispose of as part of our general business operation.

Wastewater Quality

Wastewater from homes and businesses flows to our treatment works through the wastewater network. The network has several basic components. These components include pipes and pumps. Sewers are pipes that transfer the flow of wastewater under gravity. When gravity alone cannot move the wastewater through the network we use pumps. The flow of wastewater to treatment can therefore be via a series of

CASE STUDY Managing trade effluent

In 2003 we met our internal Water Resources Act compliance target for sanitary wastewater quality. Sanitary quality is measured as concentrations of substances like ammonia and suspended solid material.

However over the past year we exceeded statutory compliance limits for non-sanitary substances such as dissolved metals.

Trade effluent is wastewater from the processes that factories and commercial premises operate. These premises discharge trade effluent into our sewerage network. The discharges can contain dissolved substances such as metals. We control the majority of these discharges from business and trade sources by giving conditional consent for the traders to discharge effluent.

The consents specify the daily volume and also the maximum amount of each substance a trader may discharge to our sewers. To enforce these consents and to monitor compliance we have a team of trade effluent account managers. These managers are responsible for regularly sampling discharges, liaising with traders and issuing new or revised trade effluent consents across our region. In spite of this we still experience

unlicensed releases of trade effluent to our sewers. Our works cannot always remove the dissolved substances in these unlicensed discharges. As a result we risk exceeding our statutory compliance limits for the substances that we are permitted to release in our treated effluents. During 2003 we exceeded statutory compliance limits for other Water Resources Act criteria such as dissolved metals. These metals, such as chromium, probably enter the sewerage network from businesses that operate in the area.

In order to address this problem we have set-up a pilot study to investigate total levels of dissolved chromium metal in the Ashford wastewater catchment in Kent. During the study we shall install monitoring devices in the sewerage network. These devices will identify and assess the likely source of dissolved chromium. The study will use passive sampler technology. This technology has already been deployed in other European countries and by the Environment Agency. It has helped to identify pollutant hot spots. Our pilot study will determine whether we can use the approach as an additional tool for managing the risk from other unlicensed trade effluent discharges.

pumping stations and gravity sewers. The combination of pumping stations and gravity sewers depends on the size and topography of the wastewater catchment area and the number of people and businesses within it.

We have a number of storm overflows at certain locations. The overflows help to prevent flooding of homes and businesses.

They manage storm water flow during heavy rainfall when the volume of flow is more than the designed capacity of the sewer. We are currently involved in two research projects into Sustainable Urban Drainage Systems (SUDS). The concept behind SUDS is to design drainage pathways that will reduce the impact from sewer overflows.

LINKS: www.environment-agency.gov.uk | www.ofwat.gov.uk | www.defra.gov.uk/environment/water/quality/bathing | www.southernwater.co.uk/bathingwaterquality | www.water.org.uk |

The growing population of the South East adds to the load that our sewerage network carries. Increased water use, due to population growth also adds to the amount of wastewater that we must treat. These additional demands on our sewerage network increase the risks of sewer flooding.

For more information

See the *Managing our future and Sustaining our future* sections of this report at www.southernwater.co.uk/sustainability

We use several stages of wastewater treatment at our treatment works (as shown in the graph opposite). First we pass the incoming flow of wastewater through grid-like screens that remove debris such as paper, grit, tampons, condoms and plastic wastes. We then use a settlement tank to remove sediment. This is known as primary treatment.

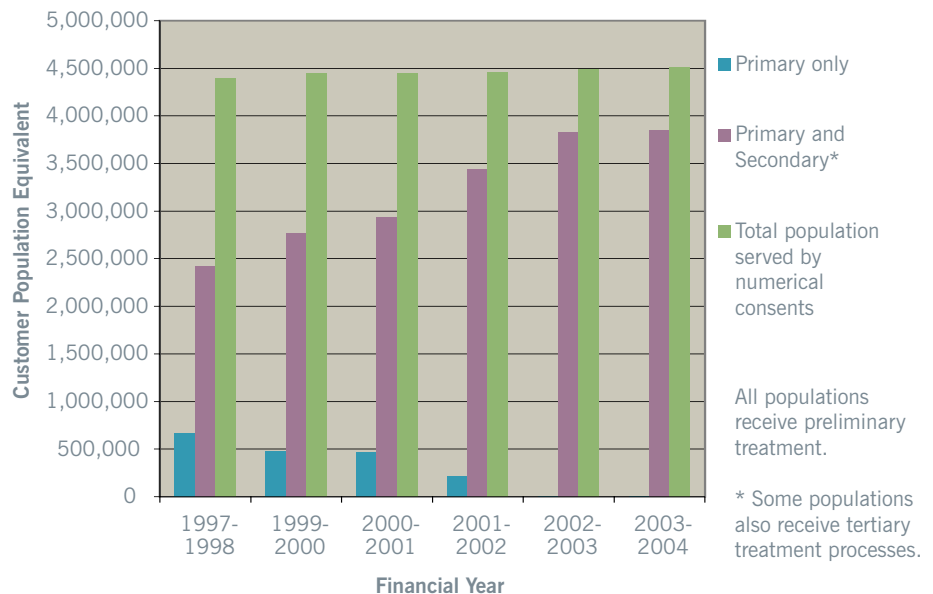
The next stage is known as secondary or biological treatment. Secondary treatment significantly reduces organic matter and pollutants such as bacteria in the water. At some sites we have a further stage of wastewater treatment. This tertiary treatment stage includes ultra violet disinfection and phosphate removal. Ultra violet treatment reduces the level of bacteria and viruses in wastewater. Phosphate removal helps to reduce excessive plant growth (that would be detrimental to fish) in watercourses into which we discharge final effluent - the final liquid product from our wastewater treatment processes is called final effluent.

Wastewater treatment types for the region are shown in the chart above by the population served. This shows that the number of treatment works only treating wastewater by primary processes alone is declining.

We determine the quality of our treated wastewater by measuring the chemical and biological content of the final effluent from our wastewater treatment processes.

In 2003 we achieved 99.9% compliance overall against the wastewater quality parameters of suspended solids, biochemical oxygen demand and ammonia. This result

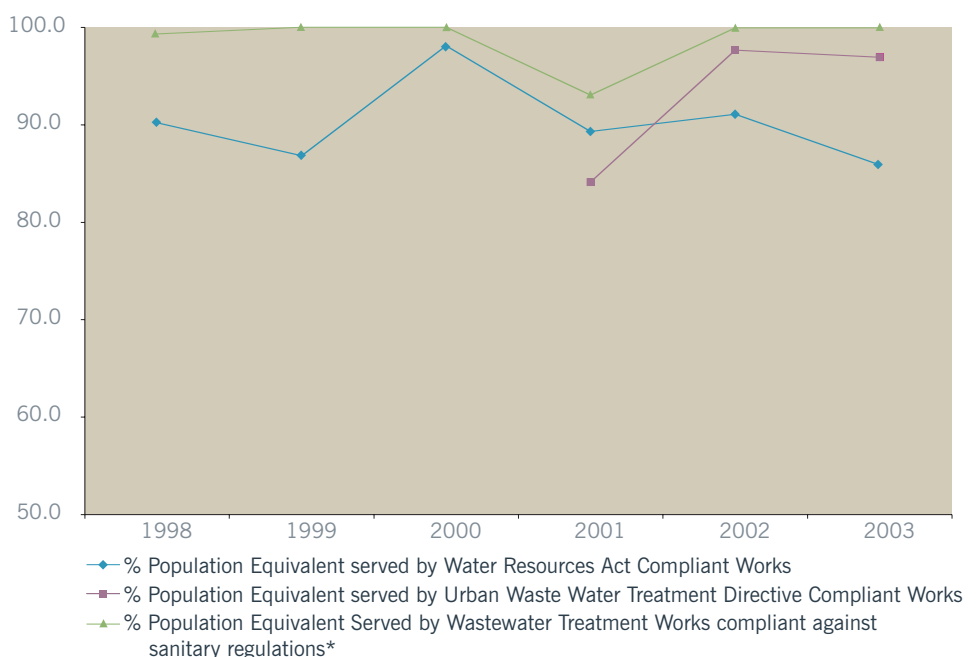
Treatment types servicing our customers



showed an improvement on our 2002 performance, despite the tightening of chemical limits on a number of Environment Agency consents for us to discharge effluent. We can only discharge treated effluent to the environment with the Agency's consent.

The European Union's Urban Waste Water Treatment Regulations protects the environment from the adverse effects of urban wastewater discharges. In 2003 our 96.9% compliance with the regulations was virtually unchanged from 2002.

Wastewater quality to 2003



* Sanitary compliance calculated in accordance with Ofwat (to represent look-up table consent conditions). Population figures are from June Return Ofwat data for 2003.

Bathing water quality compliance

We maintained this level of compliance even though the regulations applied to a greater number of sites in 2003.

Our 2003 Water Resources Act compliance was 86%. This was a decline in the performance from 2002, which showed 91%. This drop in compliance is directly related to a failed sample containing a high concentration of dissolved metals. We are investigating ways to identify the source of these dissolved metals to help prevent future compliance failures. Please see the case study in this section on Managing Trade Effluent.

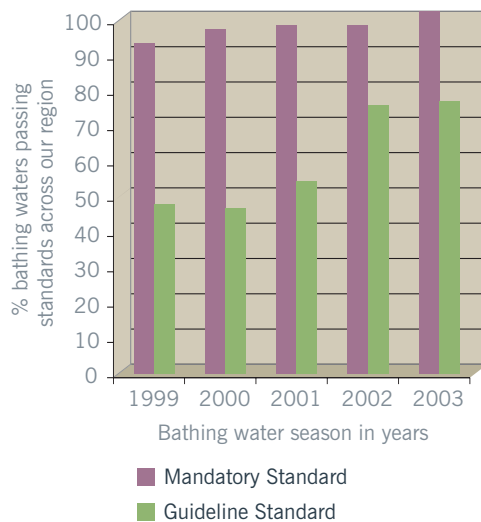
Part of the expenditure listed in our business plan for 2005 to 2010 relates to delivering the requirements of the Urban Waste Water Treatment Regulations. We are moving forward with our plans to build wastewater treatment schemes to serve both the Brighton and Hove and the Margate and Broadstairs areas.

The seas in our region continued to enjoy high quality standards. In 2003 the region's performance to the mandatory European Union (EU) Bathing Water Directive standards increased to 100% from 98.7% in 2002. This result exceeded the United Kingdom industry average of 98% reported by the Department for the Environment, Food and Rural Affairs. We have four wastewater treatment works that use ultra violet (UV) disinfection, to help us maintain compliance with bathing water quality limits.

As in 2002, we achieved almost 100% compliance with the Environment Agency ultra violet dosing requirements at these sites. This process will break down the structure of micro-organisms present in wastewater. As a consequence of this and other advanced wastewater treatment processes, higher quality final effluent leaves our works. Although the final effluent is of higher quality there is an environmental trade-off between this and the energy used in UV treatment.

For more information

See the Energy sections of this report at www.southernwater.co.uk/sustainability



The Environment Agency provided the river quality data shown in the graph below. The data relates to the Agency's Southern Region. The quality of rivers can be affected by many regional factors. The data shows a decline for 2001 to 2002 in the higher quality categories A and B. This decline is thought to result from the Environment Agency's use of new field meter quality measuring equipment.

For more information

See www.environment-agency.gov.uk/yourenv/eff/water/213902/river_qual/

At the Periodic Review in 1999 we sought increases in capital maintenance to address the condition and performance of our assets. An independent review of our submission showed that we did not receive enough funding

to support our wastewater capital maintenance. We aim to prevent any failure of our sewerage system that might cause flooding or pollution. We have asked for additional expenditure as part of our 2005 to 2010 business plan.

For more information

See the Economy and Key Performance section of this report at www.southernwater.co.uk/sustainability

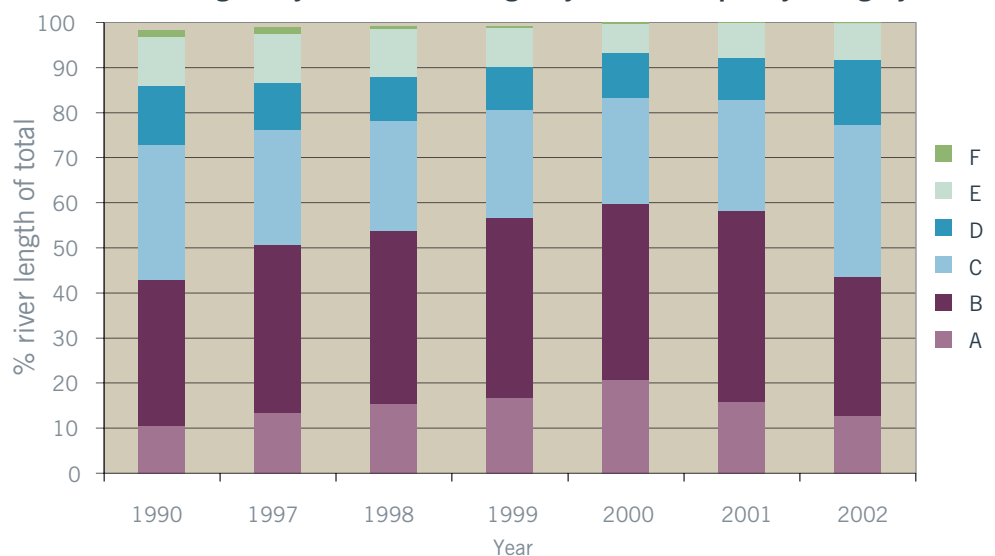
Our compliance plan helps us to maintain our wastewater performance to both regulatory and internal standards. The plan establishes risk management initiatives that target wastewater process operations as well as pollution incident response. We are currently extending our skills training for wastewater treatment operators.

For more information

See Managing our Future in the Performance Summary section of this report at www.southernwater.co.uk/library

We use a series of indicators to monitor the performance of our assets. We review these annually. We put procedures in place to ensure that we consistently deliver a clear and concise asset maintenance strategy. We prioritise the maintenance that we carry out on our assets. We do this by scoring the criticality of needs on an asset compared to its past performance. Results from this identify what further action we will take. The assets we refer to here

River lengths by Environment Agency chemical quality category



comprise the infrastructure and plant needed to run our business operations e.g. water mains, water supply works, sewers and wastewater treatment works. These assets deteriorate with age and use. They require maintenance and over time, repair, refurbishment or replacement. Sometimes alternative or additional assets may be needed to meet new demands for quality or capacity of services.

Our process scientists help maintain our wastewater quality compliance performance. These scientists react to early indications of possible failure that come from our turbidity monitoring programme. We have increased the number of wastewater treatment works the programme extends over in the last financial year. The monitoring programme uses instruments at each site that are connected to our central remote monitoring systems. Turbidity monitoring measures the clarity of the final effluent that we discharge. It provides an indication of the quality of final effluent.

Our process team also undertakes thorough investigations into any compliance breaches. Through these investigations the team assesses how we can improve site performance.

By the end of 2003-2004 we had installed 220 calibrated flow monitors. The monitors should also assist us with the performance monitoring of our treated effluent discharges. We hope that we will have these monitors installed on over 350 out of a total of 369 treatment works in our region by the end of 2004-2005.

Waste Management

We either recycle or landfill the majority of the waste that our business operations generate. We are constantly looking for new ways to manage our wastes.



About 55% of the waste we handled in 2003-2004 was derived from the solid waste that we produce when we treat sewage. The solid waste is called sewage sludge, but we call it biosolids when we have treated it.

Our sludge digestion treatment process reduces the mass of sewage sludge by 40% to make biosolids. The mass reduction reduces the amount of biosolids that we haul to farms. For more than forty years the agricultural market in the UK and Europe has used biosolids as a fertiliser. Biosolids contain plant nutrients such as phosphates. Using biosolids in this way recycles these plant nutrients.

We use biosolids to fertilise crops. Since 2002 we have applied industry guidance on Hazard Analysis Critical Control Point (HACCP) to reduce any possible disease risk in biosolids. HACCP is a food industry quality assurance system. HACCP ensures that requisite standards are continually met at each process stage. For us HACCP relates to standards for biosolids treatment. The Water Industry agreed these standards with the British Retail Consortium (BRC).

We have a sales team that markets biosolids products to farms under the *Bestway* brand. These products include dry granulated biosolids as well as biosolids to which we have added potash and lime. Each batch that we sell to farmers has a certificate of HACCP compliance. As an additional safeguard we apply guidelines from the Agricultural Development and Advisory Service (ADAS). The ADAS guidelines ensure that we use our biosolids in a safe manner on appropriate crops. Unlike conventional soil conditioners, we supply *Bestway* products as a complete service to the farmer. This service includes soil analysis, advice on crop requirements, delivery and spreading.

Not only does biosolids recycling make for good waste management practice, it also provides a sustainable fertiliser for agriculture. The UK government considers that the Best Practicable Environmental Option for biosolids is its use in the farming industry as a soil conditioner and

2003 target	Progress against target	2004 target
WASTEWATER QUALITY		
95% population equivalent served by Water Resources Act compliant works.	86% 	Maintain target.
95% population equivalent served by Urban Waste Water Treatment Directive compliant works.	96.9% 	Maintain target.
95% Bathing waters compliant with mandatory standard of EU Bathing Waters Directive.	100% Target met. DEFRA report 100% for the Southern region and 98% for the UK. 	Maintain target.
Install turbidity monitors on 57 wastewater treatment works by April 2005.	209 have now been installed and are being monitored. 	
Install flow monitoring installation on 248 wastewater treatment works (WTWs) by April 2005.	220 completed to the end of 2003-2004. 	Install flow monitoring devices on 355 WTWs (increased from 248).

KEY: Target met  In progress  Target not met 

fertiliser. The alternative to recycling biosolids is disposal to landfill or an incinerator. If we did this the requirements of our biosolids customers would have to be met by an equivalent fertiliser that has been made from mined resources.

In 2003-2004 grit and screened matter from sewers accounted for 35% of our solid waste that was not biosolids. This waste is not normally suitable for recycling. However, during the year we investigated whether this type of waste could be recycled into compost.

For more information

See the case study in the *Sustaining our Future* section of this report at www.southernwater.co.uk/sustainability

Compared with 2002-2003 we produced 35% more waste that was not biosolids in 2003-2004. In spite of having more of this type of waste we achieved a seventeen-fold increase in the amount we recycled. We landfilled 2042 tonnes less than we did in 2002-2003. We achieved this largely by recycling sludge from water supply works. Water supply works sludge is the sludge that derives from water clarification when we treat water for human consumption.

For more information

See the *Water* section of this report at www.southernwater.co.uk/sustainability

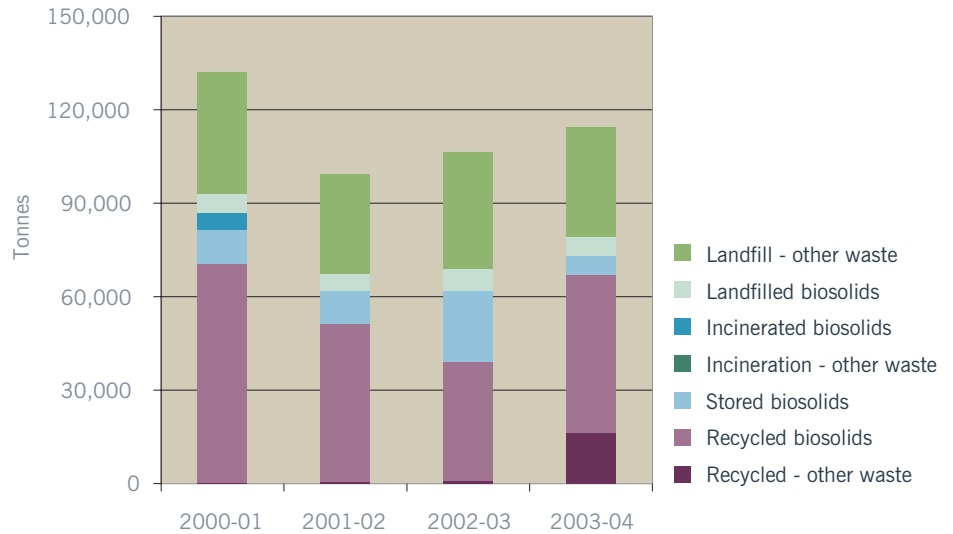
In 2003-2004 waterworks sludge accounted for 32% of our non-biosolid waste. In 2002-2003 we did not recycle any waterworks sludge. However, in 2003-2004 we recycled two thirds of our waterworks sludge.

Fly-tipping is the illegal dumping of waste. Fly-tipping was a significant problem for us in 2003-2004 as about 4% of all the waste that we sent to landfill in this period had been fly-tipped on our land. In February 2004 the Department for the Environment, Food and Rural Affairs (Defra) began a national consultation exercise on this growing problem. Defra hopes to develop a strategy to reduce the problem for landowners such as ourselves.

For more information

See the *Land, Conservation, Access and Recreation* section of this report at www.southernwater.co.uk/sustainability

Disposal route by tonnes



In 2003-2004 we recycled 50,903 tonnes dry solids (TDS) of biosolids as a fertiliser on land. This was 33% more than in 2002-2003. In both years we sent a proportion of our biosolids for disposal by landfilling. In 2003-2004 we achieved a reduction in the quantity of biosolids we disposed of in this way. During the year we sent only 6,049 TDS to landfill. This was a reduction of 948 TDS from the quantity we landfilled in 2002-2003.

We report our sludge production figures on the quantity of sludge that we receive at our

treatment works. Our treatment processes reduce this quantity by 40%. The quantity of biosolids that we recycle is therefore much less than the quantity of sludge that we receive at our treatment works. In 2003-2004 we produced 112,586 tonnes dry solids of sewage sludge. Of this we landfilled 6,150 tonnes dry solids, or 5.5% of the total. This compared favourably with 2002-2003, when we had landfilled 7% of our total sludge production. We want to reduce the percentage that we landfill to below 5% in 2004-2005.

2003-2004 target	Progress against target	2004-2005 target
WASTE MANAGEMENT		
Develop a 'controlled waste' database monitoring system.	This target was withdrawn and replaced with the development of an integrated waste framework agreement for the efficient management of waste streams.	Develop integrated waste framework agreement for efficient management of waste streams.
Pilot 'grits and screenings' composting research and development project.	Target met – see Sustaining our Future case study in the Performance Summary.	95% sewage sludge produced as biosolids recycled to land (agriculture).
Establish staged reporting for waste management returns.	This target was withdrawn and replaced with the development of an integrated waste framework agreement for the efficient management of waste streams.	
Zero prosecutions for waste management offences.	One prosecution for failing to prevent the escape of controlled waste.	Maintain target.

KEY: Target met In progress Target not met