

[www.defra.gov.uk](http://www.defra.gov.uk)

## Severn RBD

Article 5 economic analysis of water use supporting document



Llywodraeth Cynulliad Cymru  
Welsh Assembly Government



Water Framework Directive  
Article 5

Economic Analysis of Water Use

Supporting Document  
Severn River Basin District

March 2005

Department for Environment, Food and Rural Affairs  
Nobel House  
17 Smith Square  
London SW1P 3JR  
Telephone 020 7238 6000  
Website: [www.defra.gov.uk](http://www.defra.gov.uk)

Further copies of this publication are available from:

Environment Policy Economics  
EPE3 Water and Flood Management  
Defra  
Room 5/E4  
Ashdown House  
123 Victoria Street  
London SW1E 6DE  
Tel: 020 7082 8580

© Crown copyright 2005

Copyright in the typographical arrangement and design rests with the Crown.

This publication (excluding the logo) may be reproduced free of charge in any format or medium provided that it is reproduced accurately and not used in a misleading context. The material must be acknowledged as Crown copyright with the title and source of the publication specified.

Published March 2005 by the Department for Environment, Food and Rural Affairs. Printed in the UK.

## Contents

<b>1 Introduction</b>	<b>2</b>
1.1 Article 5 reporting requirements	2
1.2 Structure of the report	3
1.3 Data sources	4
<b>2 Driving forces</b>	<b>6</b>
2.1 General profile	7
2.2 Population and households	10
2.3 Economy	11
2.4 Other socio-economic characteristics	17
2.5 Area based initiatives	19
2.6 Trends in the Severn RBD economy	21
<b>3 Pressures</b>	<b>27</b>
3.1 Characteristics of water use	28
3.2 Sectors impacting on water status	33
<b>4 Water services and cost recovery</b>	<b>39</b>
4.1 Introduction	39
4.2 Water services and the Severn RBD	41
4.3 Water service providers, users and polluters	43
4.4 Current financial costs of water services	50
4.5 Revenues and financial cost recovery	53
4.6 Current level of environmental and resource costs	57
<b>5 Cost-effectiveness analysis</b>	<b>59</b>
<b>6 Improving knowledge and the information base</b>	<b>60</b>
<b>7 References</b>	<b>62</b>
<b>Annex 1 – Background data</b>	<b>63</b>
Data sources	63
Geographical areas	64
<b>Annex 2 – Experian forecasts</b>	<b>66</b>

# 1 Introduction

## 1.1 Article 5 reporting requirements

This report is a supporting document to the Article 5 report for the Severn River Basin District (RBD). It provides economic contextual and cost recovery information that provides background to the Article 5 report on the Severn RBD.

This report provides information relevant to the reporting guidance of the *Water Framework Directive* (WFD)<sup>1</sup>. The report summarises work undertaken on behalf of the Economic Advisory Stakeholder Group (England and Wales) and the UK Economics Steering Group for the WFD<sup>2</sup>. It takes account of various guides and other documentation produced through the *Common Implementation Strategy* (CIS) including the recent *ECO1 Reporting Sheet* produced by the European Commission<sup>3</sup>. In line with this latest guidance, the following areas are covered in the report:

- An overview of the socio-economic importance of water uses in the Severn RBD;
- An assessment of the current level of cost recovery for water services for households, agriculture and industry, with some indication of a first picture of cross subsidies;
- Information relating to how the cost recovery analysis was carried out and how it may be improved in the future; and
- A summary of the work completed to date to establish a base-line scenario including details of work required in the future, particularly covering more complex sectors.

<sup>1</sup> A copy of the Water Framework Directive is available at [http://europa.eu.int/eur-lex/pri/en/oj/dat/2000/l\\_327/l\\_32720001222en00010072.pdf](http://europa.eu.int/eur-lex/pri/en/oj/dat/2000/l_327/l_32720001222en00010072.pdf)

<sup>2</sup> Annex 1 provides a summary of related outputs including the reports on *The Economic Importance and Dynamics of Use* (ref 1), *Cost Recovery and Incentive Pricing* (ref 3) and *Cost-Effectiveness Analysis and Developing a Methodology to Assess Disproportionate Costs* (ref 4).

<sup>3</sup> Other relevant guidance includes the WATECO guidance and the Information Sheets produced by the Eco1 and Eco2 drafting groups of working group 2B of the CIS.

## 1.2 Structure of the report

This report contains the following sections:

- **Driving forces:** This section sets out the socio-economic characteristics of the Severn RBD and provides forecasts for population, number of households, output (in gross value added terms) and employment to 2015;
- **Pressures:** This section reports on the attempts to link economic information with the most important activities for the characterisation of water bodies and associated risk assessment;
- **Water services and cost recovery:** This section presents information received from the Office of Water Services (Ofwat) on the financial cost of public water supply and sewerage services within the Severn RBD. Details are also provided on the level of environmental expenditure by the water and sewerage companies in the RBD;
- **Cost-effectiveness:** This section details the progress made towards ensuring cost-effectiveness in implementing the Programme of Measures (PoMs). The gaps that exist are also identified; and
- **Improving knowledge and the information base:** The final section sets out a research programme to support further work under the WFD.

### 1.3 Data sources

A number of data sources have been used in compiling this document.

Information on the economic importance of water uses and their dynamics has been taken from the report on the *Economic Importance and Dynamics of Water Use Relevant for River Basin Characterisation* (ref 1). This report includes a comprehensive review of data sources relevant to the economic analysis of water use, profiles of the main sectors associated with pressures in water bodies and contextual information supplied by a number of interested stakeholder groups in the form of stakeholder templates. Information relevant to this report was provided by:

- Electricity Industry Joint Environment Programme (Powergen, RWE, Innogy, AEP, Drax Power Ltd, British Energy, EDF Energy, International Power, Scottish Power);
- British Ports Association and United Kingdom Major Ports Group;
- WaterVoice;
- British Hydropower Association;
- Royal Society for the Protection of Birds (RSPB); and
- British Waterways.

Sector profiles were compiled for:

- Power generation;
- Petrochemicals;
- Other chemicals;
- Metal manufacturing;
- Paper industry;
- Other manufacturing;
- Extractive industries;
- Quarries and aggregates;
- Transport;
- Public water supplies;
- Private water supplies;
- Wastewater treatment; and
- Recreation.

Economic forecasts for the most important activities related to water uses have been produced by Experian Business Strategies Ltd, based on output and employment information from the Office of National Statistics (ONS). Full forecasts for this RBD are provided in Annex 2. Further information related to relevant trends in the agriculture sector has been provided in a study undertaken by Cambridge University on behalf of the Environment Agency (ref 2).

Information related to the recovery of the costs of water services has been taken from the report on *Cost Recovery and Incentive Pricing* (CRIP) (ref 3) with updated information provided by Ofwat and the Environment Agency following the *Final Determination of Water Prices* for the period 2005 to 2010.

Information relevant to the analysis of the cost-effectiveness of actions to be taken under the PoMs within River Basin Management Plans (RBMPs) has been taken from the report entitled *Cost-Effectiveness Analysis and Developing a Methodology for Assessing Disproportionate Costs* (ref 4). This has been supplemented with a review of progress in implementing the *UK Collaborative Research Programme on River Basin Management Planning Economics* (CRP).

Throughout the report various descriptions of geographical areas are used e.g. ward, local authority district, etc. A definition of these can be found in Annex 1. All data and forecasts have been undertaken at RBD level. To do this, all wards have been allocated to RBDs. Where alternative geographical units are used this is clearly noted.

## 2 Driving forces

This section provides an overview of the socio-economic characteristics of the economy of the Severn RBD relevant to the economic importance and dynamics of water uses. It includes the following information:

- **General profile:** Presents an introduction to the Severn RBD in terms of location, major urban centres and distinguishing characteristics;
- **Population and households:** Presents an outline of the historical change in the Severn RBD population, number of households and population per household. This information assists in understanding the levels of domestic water use specific to the RBD;
- **Economy:** Output and employment levels are used to assess the Severn RBD economy. Using historical trend data the areas of the economy that have expanded or contracted in recent years are identified. This allows an appreciation of the key sectors that are driving the economy of the Severn RBD;
- **Other socio-economic characteristics:** Presents information for the Severn RBD specifically relating to the level of deprivation, the level of the working age population claiming Job Seeker Allowances (available to unemployed people who are both available for and actively seeking work) and the level of working age population with no qualifications. This information helps build an understanding of the potential need for Government intervention; and
- **Area based initiatives:** Presents local initiatives specific to the Severn RBD arising from Government area based policies. Many of these initiatives are focused on regeneration areas of deprivation and as such they represent an important source of Government-led land use and socio-economic changes within the RBD.

## 2.1 General profile

The Severn RBD covers an area of approximately 21,590 km<sup>2</sup> straddling the border between England and Wales and encompasses the following main urban settlements<sup>4</sup>:

- Bristol (population 380,615);
- Cardiff (population 305,353);
- Bath (population 169,045 – includes North East Somerset);
- Coventry (population 300,848);
- Telford (population 158,325); and
- Shrewsbury (population 95,850).

The Severn RBD also captures the south west corner of Birmingham (the majority of Birmingham is in the Humber RBD).

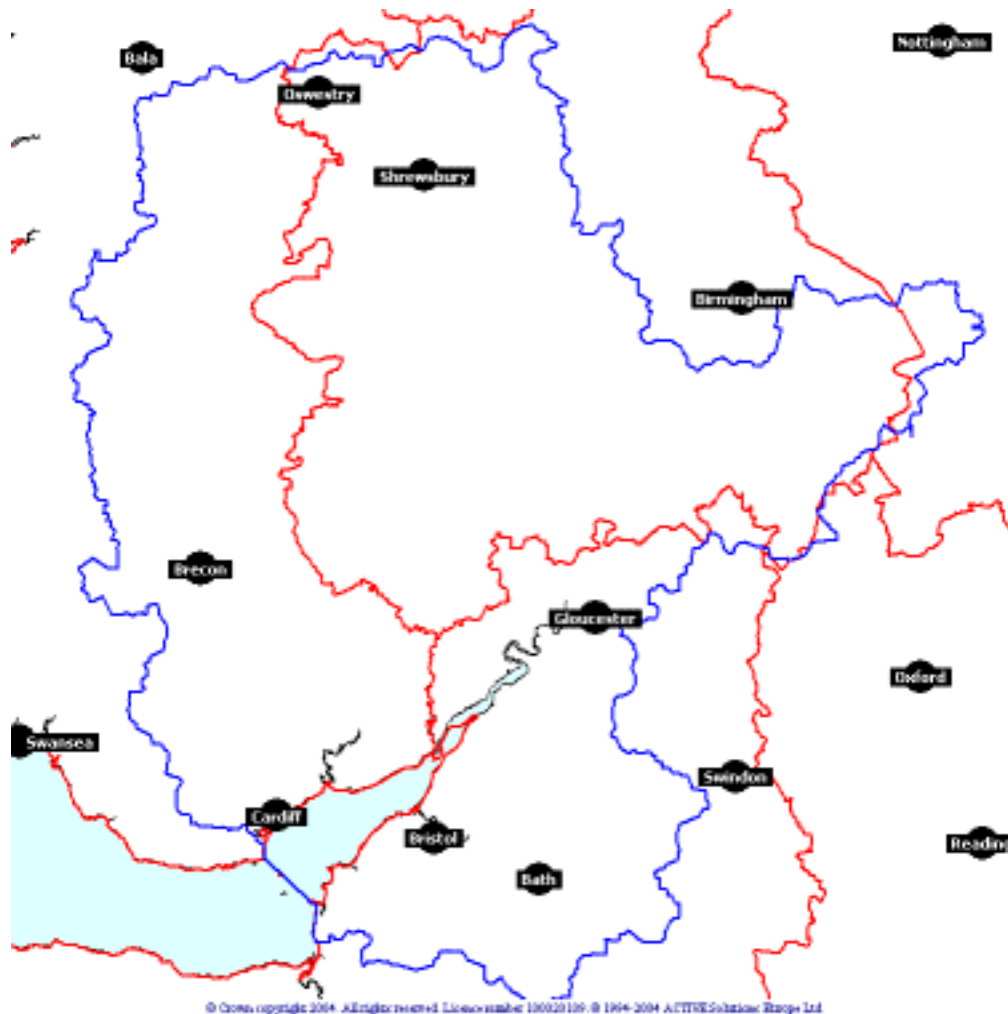
Figure 2.1 shows the boundary of the Severn RBD and indicates the principal urban settlements. Regional Development Agency (RDA) boundaries have been included.

RDAs are non-departmental public bodies. There are nine RDAs in the English Regions (generally aligning with the Government Office Regions) and their primary role is to promote economic development in their region. The RDAs were established under the *Regional Development Agencies Act 1998*.

RDA boundaries have been included as these are the most relevant regional policy areas from an economic point of view. The most relevant economic information is also available on a RDA basis, not a RBD basis. The Severn RBD is covered by five RDAs: Welsh Development Agency, South West of England Development Agency, South East of England Development Agency, Advantage West Midlands and the East Midlands Development Agency.

<sup>4</sup> Census, 2001

Figure 2.1: Severn RBD and RDA boundaries



**Legend**

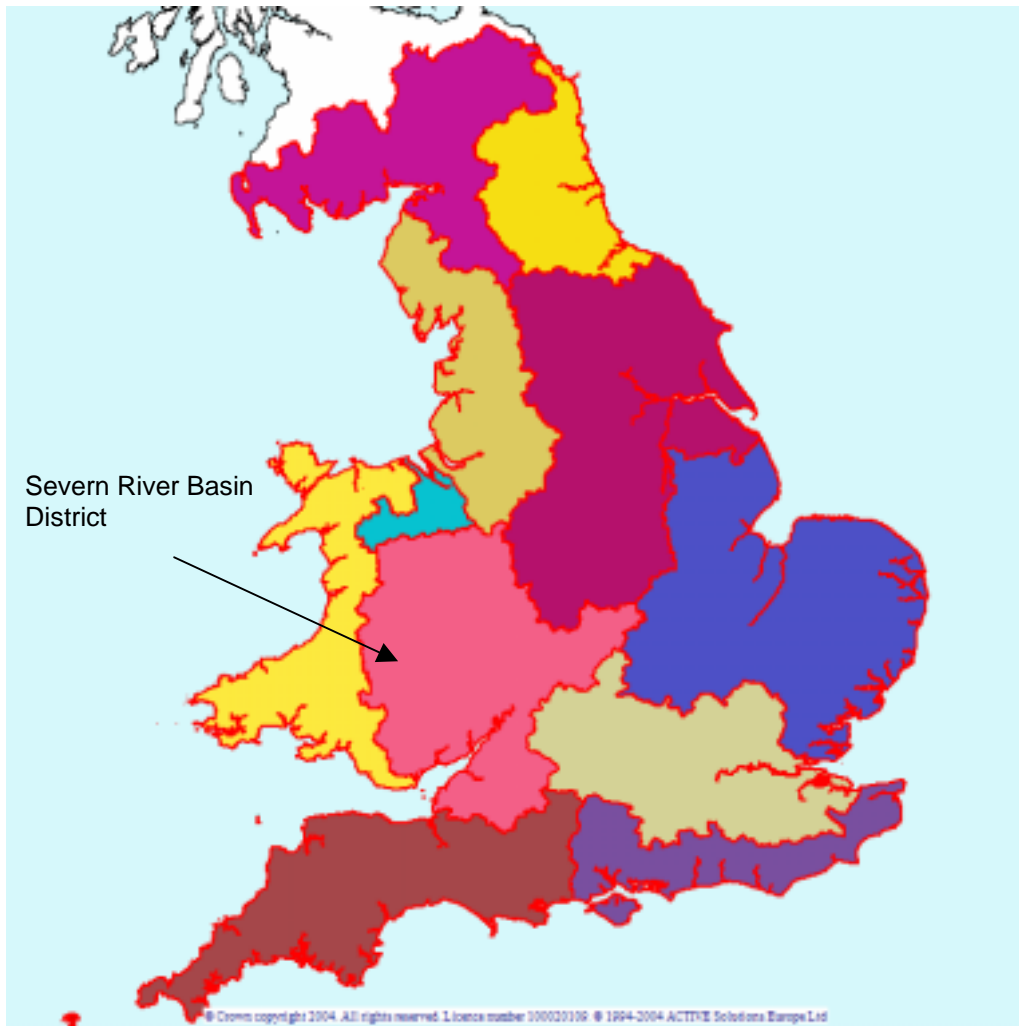
Severn RBD Boundary — RDA Boundaries —

Much of the Severn RBD is rural in nature, particularly within the Welsh border. The RBD contains the Forest of Dean and sections of the Brecon Beacons and Cotswolds. There are average levels of arable farming and above average levels of pastoral farming, in particular the farming of sheep, goats and horses for which Severn RBD accounts for 25 per cent of the total in England and Wales<sup>5</sup>.

For additional context, the location of the Severn RBD within England and Wales is illustrated in Figure 2.2 below.

<sup>5</sup> Environment Agency

**Figure 2.2: Severn RBD**



## 2.2 Population and households

Table 2.1 indicates the Severn RBD population in 1995 and 2002 based on NOMIS<sup>6</sup> Ward 2002 datasets. The percentage changes in the Severn RBD are compared against the average percentage changes for all RBDs.

The Severn RBD population has increased between 1995 and 2002 at a rate slightly above the average rate for all RBDs. The total increase over this period was 2.6 per cent compared with an increase of 2.1 per cent for all RBDs in England and Wales.

There were 2.08 million households in the Severn RBD in 1995 and 2.22 million in 2002. The number of households increased by 6.8 per cent between 1995 and 2002, compared with 6.9 per cent for all RBDs.

**Table 2.1: Severn RBD population, number of households and population per household**

	1995	2002	Change 1995-2002 (%)	
<b>Population (000s)</b>				
Severn	5,183.1	5,318.2	Severn	2.6
			All RBDs	2.1
<b>Households (000s)</b>				
Severn	2,079.4	2,220.6	Severn	6.8
			All RBDs	6.9
<b>Population per household</b>				
Severn	2.49	2.39	Severn	-3.9
			All RBDs	-4.5

Source: Experian Business Strategies Ltd

The number of households within the RBD influences levels of water use. With no change in population, per capita water consumption will generally increase if the number of households increases. The average household size in the Severn RBD has declined since 1995. This decline, however, has been at a slightly below average rate compared to the average across all RBDs.

<sup>6</sup> The UK's web-based database of labour market statistics, see [www.noisweb.co.uk](http://www.noisweb.co.uk)

## 2.3 Economy

To understand the economy of the South West RBD trends in output and employment between 1995 and 2002 have been examined. Both output and employment have been broken down into broad industry categories based on 30 Standard Industrial Classification (SIC) codes. Employment and output categories are also broken down into more detailed SIC codes. The disaggregated codes were chosen on the basis of an assessment of the main activities associated with pressures on water quality, including, pressures from abstraction, discharges and hydromorphology as revealed by the Environment Agency's *Pressures and Impact Analysis*<sup>7</sup>.

Detailed information on output and employment categories is provided in Annex 2.

### 2.3.1 Output

Table 2.2 illustrates output for the Severn RBD by the 30 SIC codes. The summation of these 30 SIC categories provides a measure of the total output of the Severn RBD in value added terms. Total output was £70.1 billion in 2002.

Between 1995 and 2002 output from the Severn RBD grew by £11.5 billion, or 19.6 per cent. This equates to a growth rate of 2.6 per cent per year. Business services, Wholesale & distribution, and Public administration & defence are the three sectors that contributed the most to the Severn RBD's output.

<sup>7</sup> This work will be built upon in later stages of the risk assessment. It is based on the identification of correspondences between the lists of activities which have been associated with pressures (for example through the analysis of the National Abstraction Licensing Database and Charges for Discharges Database) with Standard Industrial Classification categories. Analysis reveals that correspondence is highly variable across the main activity-pressure categories.

**Table 2.2: Severn RBD (2002) output ranked by 30 SIC categories**

Rank	SIC category	Output 2002 (£ millions at 2000 prices)	Per cent of total output	Per cent average all RBDs
1	Business services	7123.2	10.2%	13.4%
2	Wholesale & distribution	5409.4	7.7%	7.5%
3	Public administration & defence	5093.9	7.3%	5.5%
4	Health	4788.5	6.8%	6.7%
5	Education	4630.7	6.6%	5.8%
6	Construction	4553.3	6.5%	6.0%
7	Retailing	4317.6	6.2%	6.1%
8	Banking & insurance	3177.1	4.5%	5.9%
9	Other services	3140.2	4.5%	5.3%
10	Transport	2693.8	3.8%	5.4%
11	Communications	2484.6	3.5%	3.6%
12	Hotels & catering	2362.2	3.4%	3.4%
13	Transport equipment	2306.8	3.3%	1.9%
14	Other financial & business services	2197.5	3.1%	4.2%
15	Metals	2135.9	3.0%	1.9%
16	Electrical & optical equipment	1892.4	2.7%	1.9%
17	Gas, electricity & water	1730.1	2.5%	2.0%
18	Food, drink & tobacco	1728.3	2.5%	2.4%
19	Machinery & equipment	1666.1	2.4%	1.5%
20	Paper, printing & publishing	1564.5	2.2%	2.6%
21	Agriculture, forestry & fishing	1131.3	1.6%	1.0%
22	Rubber & plastics	957.6	1.4%	0.9%
23	Other manufacturing	944.7	1.3%	0.9%
24	Chemicals	749.5	1.1%	2.0%
25	Minerals	409.3	0.6%	0.6%
26	Textiles & clothing	337.7	0.5%	0.6%
27	Other mining	269.6	0.4%	0.3%
28	Wood & wood products	254.4	0.4%	0.3%
29	Fuel refining	70.6	0.1%	0.3%
30	Oil & gas extraction	13.1	0.0%	0.1%
	<b>Total 2002 RBD output</b>	<b>70133.9</b>		

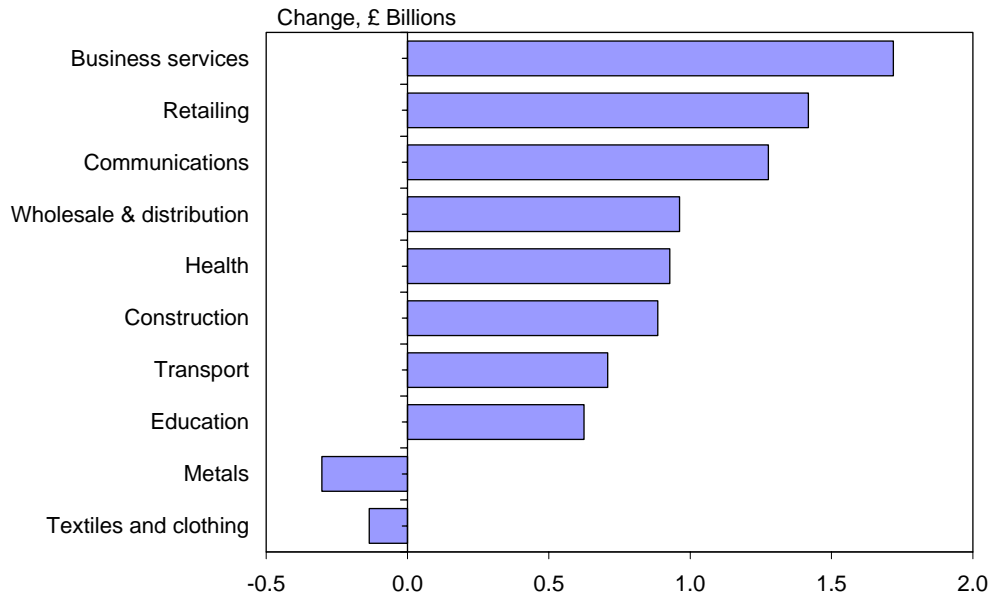
Source: Experian Business Strategies Ltd

Sectors of significance which provide an above average contribution to the Severn RBD's output include:

- Construction;
- Retailing;
- Transport; and
- Communications.

Table 2.3 illustrates the sectors that experienced a significant change in output value during this period. The largest increase in terms of value between 1995 and 2002 was in the Business services sector which grew by £1.7 billion.

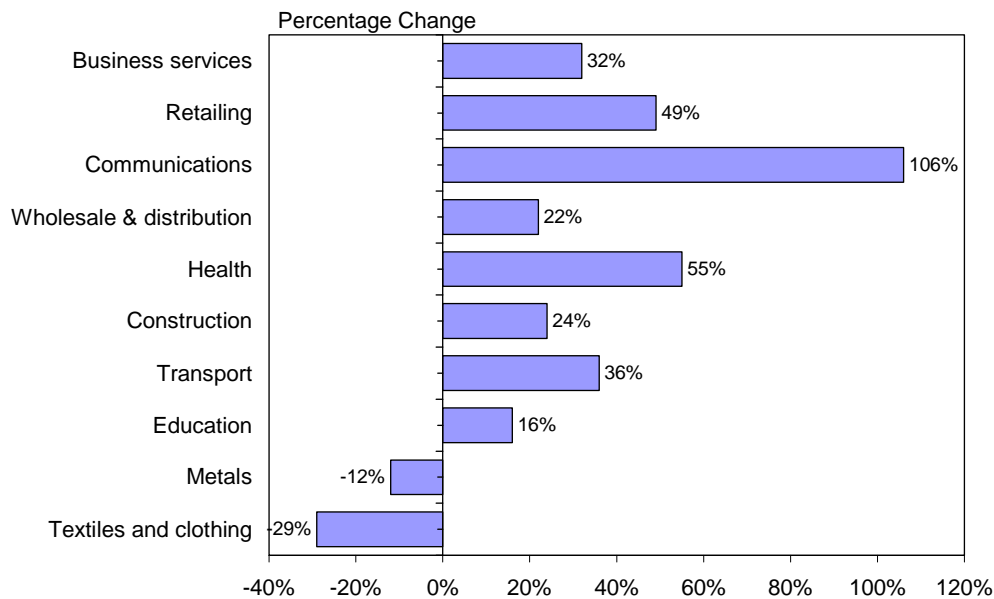
**Figure 2.3: Change in output, Severn RBD, 1995 to 2002**



Source: Experian Business Strategies Ltd

Figure 2.4 below illustrates the percentage change in output between 1995 and 2002 for the sectors illustrated in Figure 2.3. Business services, which had the largest increase in value terms, grew by 32 per cent during this period. The largest percentage increase was in the Communications sector. Output from this sector more than doubled between 1995 and 2002, experiencing a growth of 106 per cent.

**Figure 2.4: Percentage change in output, Severn RBD, 1995 to 2002**



Source: Experian Business Strategies Ltd

### **2.3.2 Employment**

The largest employment sectors for the Severn RBD are the Business services, Retailing and Health sectors.

Sectors of significance which provide an above average contribution to the Severn RBD's employment include:

- Education;
- Food, drink & tobacco; and
- Other financial & business services.

The number of employees in each of the 30 SIC categories is illustrated in Table 2.3 below. Further detail on the employment in the most important water use related disaggregated SIC categories is provided in Annex 2.

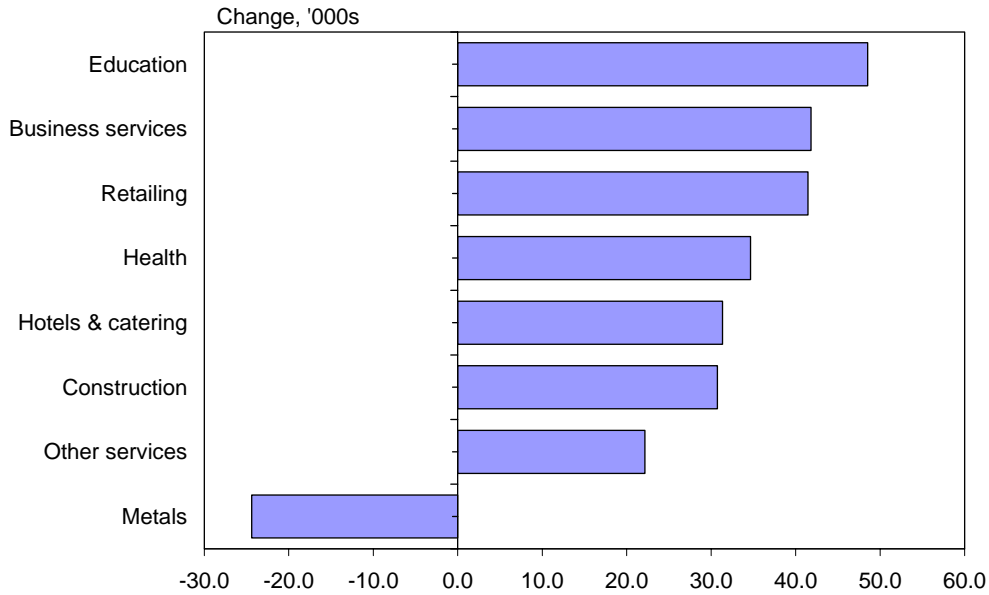
**Table 2.3: Severn RBD (2002) employment ranked by SIC category**

Rank	SIC category	Employment (000s)	Per cent of total employment	Per cent average all RBDs
1	Business services	261.4	11.3%	13.3%
2	Health	255.0	11.0%	10.6%
3	Retailing	253.8	10.9%	10.9%
4	Education	215.4	9.3%	8.5%
5	Wholesale & distribution	155.4	6.7%	6.8%
6	Hotels & catering	152.7	6.6%	6.7%
7	Public administration & defence	135.8	5.8%	5.4%
8	Other services	108.2	4.7%	5.2%
9	Construction	107.2	4.6%	4.3%
10	Banking & insurance	80.4	3.5%	4.1%
11	Transport	67.8	2.9%	4.0%
12	Metals	66.3	2.9%	1.8%
13	Transport equipment	54.2	2.3%	1.5%
14	Communications	48.7	2.1%	2.1%
15	Electrical & optical equipment	48.6	2.1%	1.6%
16	Other financial & business services	46.4	2.0%	2.6%
17	Machinery & equipment	45.6	2.0%	1.3%
18	Food, drink & tobacco	41.9	1.8%	1.8%
19	Paper, printing & publishing	34.8	1.5%	1.8%
20	Rubber & plastics	29.1	1.3%	0.9%
21	Other manufacturing	26.3	1.1%	0.8%
22	Agriculture, forestry & fishing	25.5	1.1%	0.9%
23	Gas, electricity & water	13.0	0.6%	0.5%
24	Textiles & clothing	12.6	0.5%	0.8%
25	Minerals	11.4	0.5%	0.5%
26	Chemicals	11.2	0.5%	0.9%
27	Wood & wood products	9.1	0.4%	0.3%
28	Other mining	3.9	0.2%	0.2%
29	Fuel refining	0.8	0.0%	0.1%
30	Oil & gas extraction	0.3	0.0%	0.1%
	<b>Total</b>	<b>2322.8</b>		

Source: Experian Business Strategies Ltd

Between 1995 and 2002 employment in the Severn RBD grew by 233,800 to reach 2,322,800 in 2002. Figure 2.5 illustrates the most significant employment growth sectors. Education and Business services displayed the greatest growth in employment. In contrast, employment in the Metals sector declined during this period.

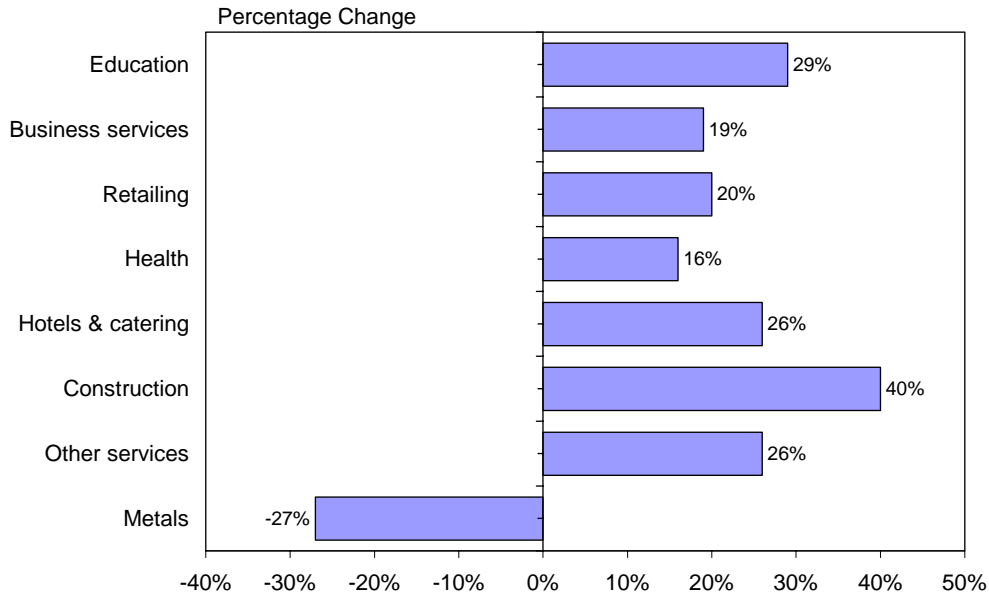
**Figure 2.5: Change in employment, Severn RBD, 1995 to 2002**



Source: Experian Business Strategies Ltd

Figure 2.6 details the percentage change in employee numbers between 1995 and 2002 for the sectors illustrated in Figure 2.5. The Construction sector grew at the greatest rate, increasing employment by 40 per cent.

**Figure 2.6: Percentage change in employment, Severn RBD 1995 to 2002**



Source: Experian Business Strategies Ltd

## **2.4 Other socio-economic characteristics**

Apart from output and employment, there are a number of other indicators that present important economic information on the distribution of wealth and economic opportunities in a region. These include information on deprivation (which includes information on relative income, employment, health, education, housing and child poverty), unemployment and qualifications. Information on Government area based policies is also presented. These provide an indication of Government programmes that may impact on development in the RBD, and therefore may have an impact on water use.

### **2.4.1 Deprivation indices**

Using the Indices of Multiple Deprivation for England and Wales, produced by the Office of National Statistics<sup>8</sup>, a collation of the 50 most deprived and the 50 least deprived wards by RBD can be used as an indicator of deprivation within each of the RBDs. It should be noted, however, that ward boundaries are not consistent with RBD boundaries. Consequently, some of the most/least deprived wards may be in more than one RBD.

The Index of Multiple Deprivation is comprised of six parameters:

- Income;
- Employment;
- Health deprivation and disability;
- Education, skills and training;
- Housing; and
- Geographical access to services.

The Severn RBD contains 10 of the 50 least deprived wards, and only one of the 50 most deprived wards in England and Wales. Areas around Cardiff generally scored very well and a number were among the least deprived wards/unitary authorities in England and Wales.

### **2.4.2 Claimant count and qualifications**

The Severn RBD crosses several administrative districts and therefore a single district cannot be used as a proxy to assess the level of unemployment in the RBD. Instead, Job Seeker Allowance (JSA) claimant count as a proportion of working age population has been assessed for the major centres within the Severn RBD.

To measure qualifications, the percentage of the working age population within the Severn RBD without any qualifications is assessed for the same major centres within the RBD.

<sup>8</sup> [www.statistics.gov.uk](http://www.statistics.gov.uk)

The Severn RBD appears to have a below average claimant count in the areas considered. The lowest claimant count was recorded for Bath and North East Somerset. This Local Authority District also had a relatively low level of the working age population without qualifications. On average, a relatively small proportion of the working age population is without any qualifications.

**Table 2.4: Claimant count and qualifications for major centres within the Severn RBD**

<b>Local Authority District</b>	<b>Claimant count (percentage)</b>	<b>Percentage of working age population with no qualifications</b>
Bath and North East Somerset	0.9	9.2
Bristol	2.0	12.3
Gloucester	2.1	12.6
Cardiff	2.2	14.7
Powys	1.5	15.3
Shrewsbury and Atcham	1.3	8.8
Oswestry	1.5	n/a
<b>UK Average</b>	<b>2.2</b>	<b>15.6</b>
<b>Wales Average</b>	<b>2.1</b>	<b>18.8</b>

Source: NOMIS 2004

## 2.5 Area based initiatives

Area based initiatives (ABI) represent the main source of geographically targeted Government interventions into the economy and communities in England. An appreciation of the extent and coverage of ABIs is therefore important in understanding the Government led dynamics of the RBD's economy. While ABIs remain very significant sources of change, there is an increasing trend towards mainstreaming area based policies (so that main Government programmes help to fulfil the ABI objectives).

The relationship between ABIs and pressures and impacts in terms of the River Basin will not always be clear. There are complex interactions between the initiatives, main Government programmes, the wider economy and environment policy. They remain however an important component of the socio-economic profile of areas and will need to be considered in the further development of characterisation and risk assessment particularly in terms of the baseline and the subsequent development of PoMs.

Figure 2.7 shows the major Area Based Initiative in the Severn: the *Neighbourhood Renewal Fund* (NRF), as well as a small number of deprived areas.

As the map reveals, the Severn RBD has relatively few areas of deprivation. Small areas of the 10 per cent most deprived Super Output Areas exist around Bristol, Weston-super-Mare, Gloucester, Coventry and Birmingham.

The RBD also has small areas which are under the Government's NRF around west Bristol and towards Avonmouth as well as around Coventry and the corner of Birmingham. The NRF aims to enable England's 88 most deprived authorities, in collaboration with their Local Strategic Partnership, to improve services, narrowing the gap between deprived areas and the rest of the country.

The NRF aims to deliver:

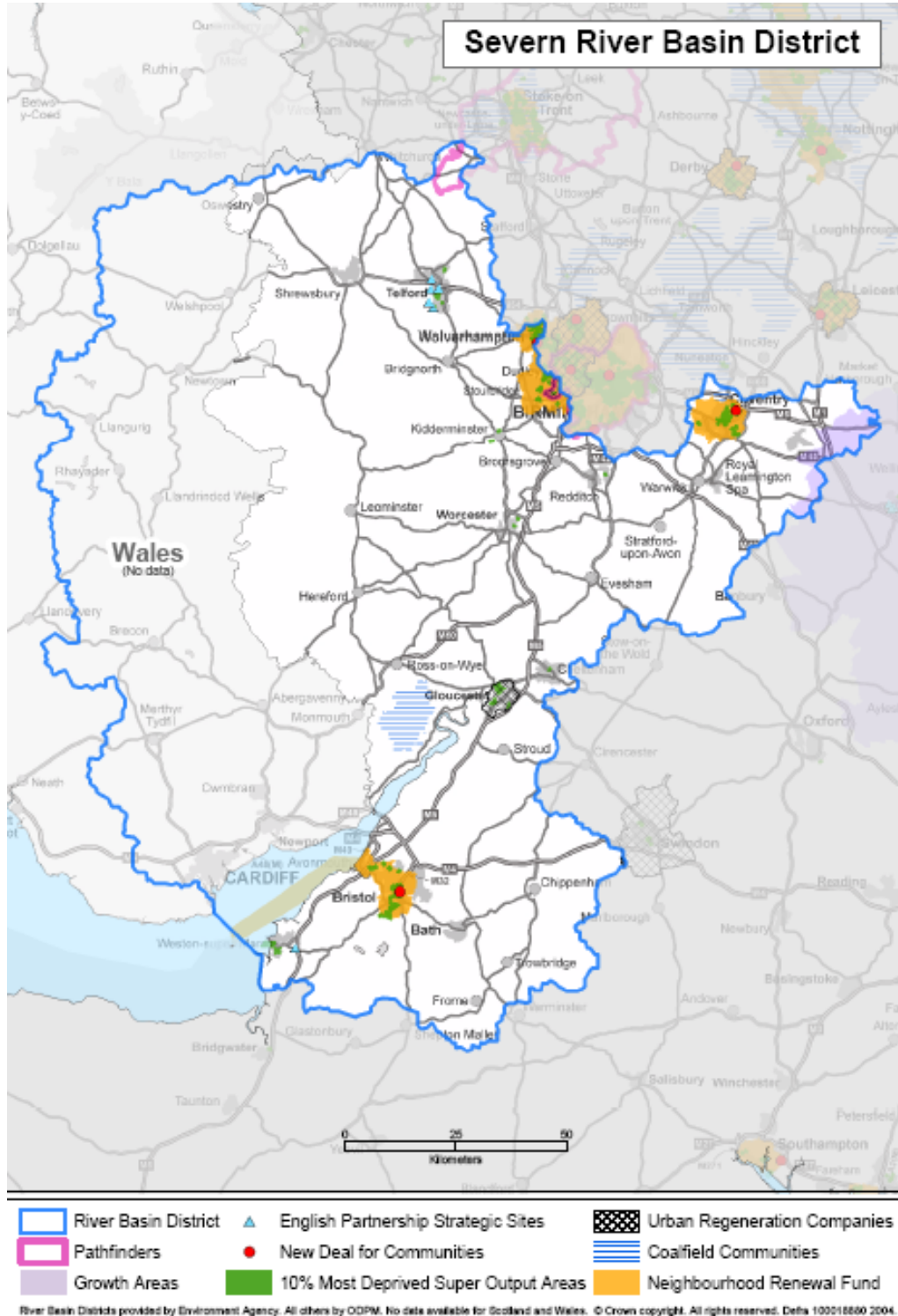
- Economic prosperity;
- Safe communities;
- High quality education;
- Decent housing; and
- Better health to the poorest parts of the country<sup>9</sup>.

One Urban Regeneration Company exists in the Severn RBD, 'Gloucester Heritage' and receives funding from the South West Regional Development Agency, English Partnerships, Gloucester City Council and Gloucestershire County Council.

<sup>9</sup> Further information on the Neighbourhood Renewal Fund can be found on the following website: [www.neighbourhood.gov.uk](http://www.neighbourhood.gov.uk)

Unlike the other RBDs in England and Wales, the Severn does not contain any coalfield areas or growth areas.

Figure 2.7: Severn RBD area based initiatives



## 2.6 Trends in the Severn RBD economy

Forecasts for the Severn RBD have been conducted by Experian Business Strategies Ltd up to 2015. Forecasts have been undertaken for population, households, output and employment. Detailed forecasts for the most important water use related SIC categories and a description of the forecast methodology are found in Annex 2.

The Experian forecasts were developed specifically for the economic analysis for the WFD. They represent the only nationally consistent RBD based forecasts of the main economic parameters currently available. In addition to the standard sectoral splits, additional sub-sectors have been forecast for output and employment based on the results of the analysis of impacts and pressures in the *River Basin Characterisation*. Discussions with stakeholders reveal in many cases that these forecasts could be improved upon as they may not have been able to take into account some sector specific parameters relating to likely future trends. Further work on rationalising these forecasts is planned.

### 2.6.1 Population and households

The Severn RBD population is forecast to increase between 2002 and 2015 by 5.1 per cent. This is slightly above the forecast average trend across all RBDs.

An increase in the number of households of over 250,000 is forecast between 2002 and 2015. This equates to an increase of approximately 20,000 houses per annum.

The population per household in the Severn RBD is forecast to continue to decline between 2002 and 2015 in line with the average trend across all RBDs.

**Table 2.5: Forecast change in population, households and population per household in the Severn RBD, 2002 to 2015**

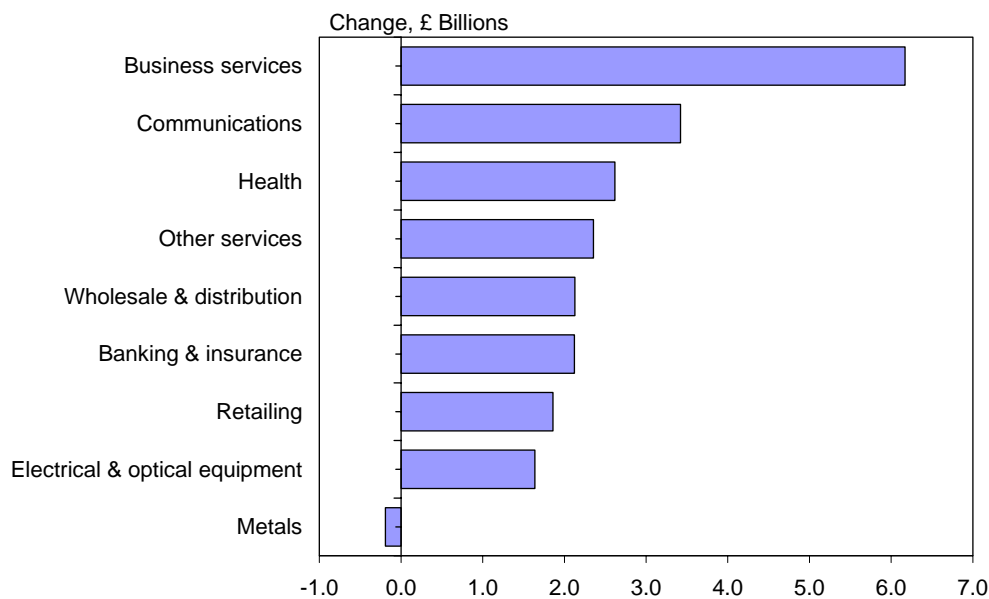
	2002	2015	Change 2002-2015 (%)	
<b>Population (000s)</b>				
Severn	5,318.2	5,589.5	Severn	5.1
			All RBDs	4.6
<b>Households (000s)</b>				
Severn	2,220.6	2,475.7	Severn	11.5
			All RBDs	11.2
<b>Population per household</b>				
Severn	2.5	2.4	Severn	-5.7
			All RBDs	-5.9

Source: Experian Business Strategies Ltd

## 2.6.2 Output

Between 2002 and 2015 output in the Severn RBD is forecast to increase by £29 billion in 2000 prices (or 2.7 per cent per annum). The main growth sectors in terms of value are illustrated in Table 2.8 below. As can be seen, output is predicted to grow most strongly in the Business services sector. Very few sectors are forecast to decline in output, with the largest anticipated decline in output expected in the Metals sector. Interestingly, between 1995 and 2002 Education was the largest growth sector. During the forecast period, between 2002 and 2015, Education is expected to experience a slower rate of growth than in the period since 1995.

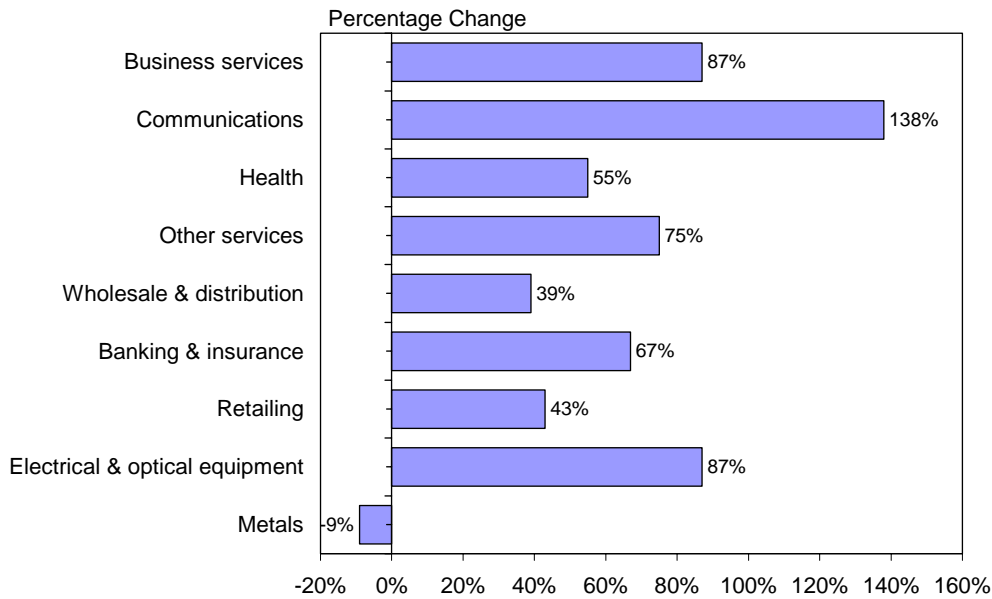
**Figure 2.8: Forecast change in output, Severn RBD, 2002 to 2015**



Source: Experian Business Strategies Ltd

Figure 2.9 illustrates the percentage growth rates for the sectors illustrated in Figure 2.8. Business services, the sector anticipated to increase by the greatest value is forecast to increase by 87 per cent. The highest rate of growth is forecast in the Communications sector which is anticipated to grow by 138 per cent between 2002 and 2015.

**Figure 2.9: Forecast percentage change in output, Severn RBD, 2002 to 2015**



Source: Experian Business Strategies Ltd

### 2.6.3 Employment

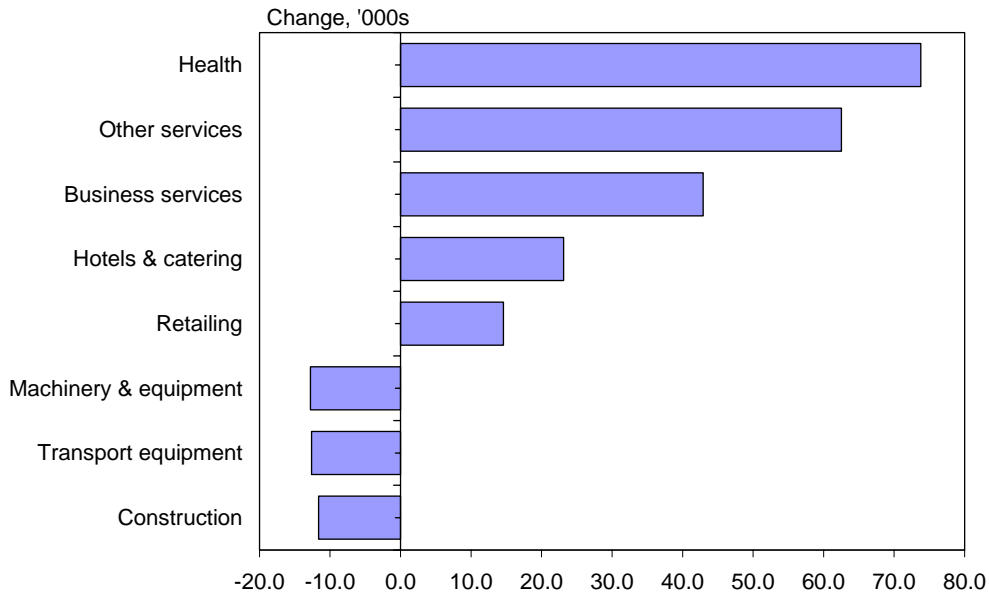
An increase in employment between 2002 and 2015 is forecast but the level in growth is below that forecast for output. Employment is forecast to increase by 138,300 or 0.4 per cent per annum, during this period.

Figure 2.10 details the sectors forecast to have the most significant changes in employment. The greatest growth in employment numbers is forecast to be in the Health sector, which is forecast to see an increase in employment numbers of 75,000. The second largest growth is forecasted to take place in the 'Other services' sector. The 'Other services' sector is anticipated to grow at the fastest rate, increasing employment by 58 per cent. This sector covers SIC categories 90-95 and includes the following activities:

- Sewage and refuse disposal, sanitation and similar activities;
- Activities of membership organisations not elsewhere covered;
- Recreational, cultural and sporting activities; and
- Other services activities (e.g. washing and dry cleaning of textile and fur products, hairdressing and other beauty treatment, physical well-being activities).

Decline in employment is forecast in the Machinery & equipment, Transport equipment and Construction sectors.

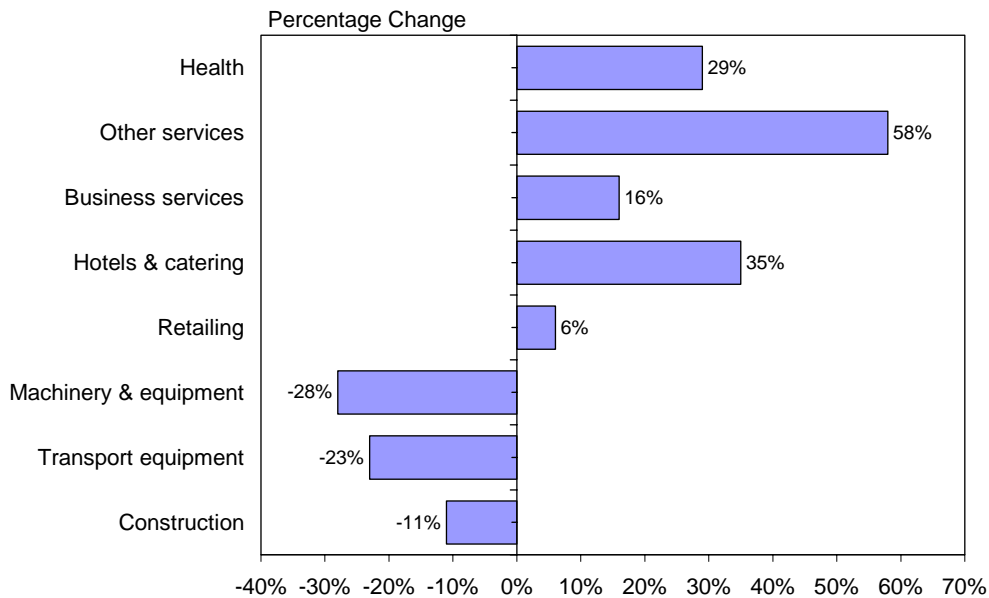
**Figure 2.10: Forecast changes in employment, Severn RBD 2002 to 2015**



Source: Experian Business Strategies Ltd

Figure 2.11 outlines the percentage change in employee numbers between 2002 and 2015 for the sectors illustrated in Figure 2.10.

**Figure 2.11: Forecast percentage change in employment, Severn RBD, 2002 to 2015**



Source: Experian Business Strategies Ltd

A full list of forecasts for both employment and output forecasts for the Severn RBD is attached as Annex 2. This contains a greater level of disaggregation of SIC codes based on the analysis of impacts and pressures.

These trends are consistent with the *Regional Economic Strategies* (RESs) of the relevant English Regions (South West and West Midlands and the Welsh Assembly Government (WAG) and Welsh Development Agency's (WDA) strategy for employment sites and buildings across Wales for the next four years (*Property Strategy for Employment in Wales (2004-2008)*)<sup>10</sup>.

The West Midlands RES (*The West Midlands Economic Strategy and Action Plan 2004 – 2010*)<sup>11</sup> identifies a number of growing and embryonic/aspirational business clusters in areas such as specialist business and professional services, information and communication technology, environment technologies, media and medical technologies. These are identified alongside existing established clusters in the West Midlands economy of transport and building, food and drink, tourism and high value consumer products.

To support these developments the RES identifies strategic sites, regeneration areas as well as three specific technology corridors which lie in the northern part of the RBD. The strategy aims to ensure a balanced portfolio of sites is available to meet future economic needs. This portfolio includes Regional Investment Sites (aimed at providing support for the cluster development) focussing on the central and Coventry–Solihull–Warwickshire technology corridors, the Coventry and Nuneaton, South Black County and West Birmingham Regeneration Zone; Major Investment Sites (to accommodate large scale inward investment) focussing on several areas, including Wobaston Road, (South Staffordshire/Wolverhampton) and Regional Logistics Sites (focussing on warehousing and distribution uses), particularly around North Staffordshire and Telford.

The *South West RES* identifies priority areas as food and drink, advanced engineering & aerospace, information and communications technology (ICT), tourism and marine. Emerging priority sectors include creative industries, environmental and bio-technologies. Meeting the development needs of these priority sectors will be based on the spatial strategy set out in the *Regional Planning Guidance (RPG10)* which aims to deliver a sustainable pattern of development in the region. A sequential approach to the location of development will help concentrate growth in the 11 Principal Urban Areas and other designated centres. This will aim to minimise the need to develop on greenfield sites and reduce pressure on rural areas. The Principal Urban Areas within this part of the Severn RBD include Bristol, Bath, Gloucester and Cheltenham.

The *Property Strategy for Employment in Wales (2004-2008)* identifies a range of sectors for which strategic property planning is necessary. These cover a broad range of activities including emerging industries, high tech manufacturing, high level services, mainstream manufacturing, office services, general services, leisure and tourism and processing industries. In

<sup>10</sup>

[http://www.wda.co.uk/resources/Property\\_Strategy\\_for\\_Employment\\_in\\_Wales\\_2004\\_to\\_2008.doc](http://www.wda.co.uk/resources/Property_Strategy_for_Employment_in_Wales_2004_to_2008.doc)

<sup>11</sup> <http://www.advantagewm.co.uk/economic-strategy-overview--1739-319-k-.pdf>

terms of development sites the strategy provisionally identifies a need for a premier business park which is only likely to be viable in the Greater Cardiff area and hence likely to be within the Severn RBD. The strategy also outlines plans for a small number of smaller business parks, some of which would be located along the M4 corridor, which traverses the Severn RBD. A further 15-20 strategic sites, concentrated on large centres of population with close proximity to the primary road network, have been proposed; it is expected that some of these will fall within the Severn RBD. Further urban centre office developments will raise the output capacity of the main population centres, such as Cardiff/Cardiff Bay, Newport, Merthyr Tydfil and Cwmbran. Finally, an extensive network of industrial estates and local sites will be established in relation to business parks and strategic sites to serve sub-regional and local markets; the Severn RBD should expect some share of the proposed 50-70 sites. Re-investment and refurbishment, rather than new development, will be the primary mechanism through which these proposals will be realised.

### 3 Pressures

This section presents information on water use, covering the main pressure categories related to abstractions, discharges and hydromorphological alterations. This information has been assembled on the basis of the analysis of impacts and pressures. There are currently limits to the extent to which specific activities (e.g. farming) can be linked to pressures (e.g. morphology). This is a main component of future work on characterisation, which will improve the analysis in later years. The following analysis is based on currently available information on an RBD basis where this is possible. These sections should be read in conjunction with the *River Basin Characterisation* (RBC) risk analysis to provide a better understanding of the main activities associated with pressures in this RBD.

## 3.1 Characteristics of water use

### 3.1.1 Abstractions

Abstractions from water bodies are undertaken for a number of purposes, including providing drinking water for households and use of water in industrial processes.

Table 3.1 gives a breakdown of the abstractions in the Severn RBD by purpose in order of magnitude. The basis for abstractions analysis is the Environment Agency's 2001 abstraction dataset. This dataset was originally extracted from the National Abstraction Licensing Database (NALD). The abstraction source's annual total has been expressed as a daily rate (megalitres per day); however, it should be noted that these daily figures do not reflect seasonal variations to water use<sup>12</sup>.

For all abstraction sources, estimated returns to watercourses are excluded. Some industries, in particular the electricity industry, use water for cooling purposes and return the water to its source after it has been used. The table also excludes abstractions from saline estuaries and coastal waters, which is a substantial source of cooling water for some power stations. For these industries, total abstractions are higher than those presented in Table 3.1.

The way in which water is abstracted can vary. This can also impact on water status. Low flow schemes can reduce the impact of abstractions on the environment. These schemes present costs to water companies.

The Environment Agency has developed sustainable abstraction levels which are going to be applied to water companies in the next business planning period, 2005-2010. In future years, sustainability reductions are likely to impact on abstraction levels.

The main abstractions in the Severn RBD are by the public water supply (94.29 per cent), agriculture (2.95 per cent) and manufacturing (1.89 per cent) industries. It should be noted that abstractions by water companies supply water for both household and non-household consumption, which include some industrial and commercial uses, as well as consumption by schools, hospitals etc. The water and agriculture sectors in the Severn RBD are proportionally above average abstractors compared to other RBDs. The licensed abstraction of water for public water supply in the Severn RBD is considerably above average.

<sup>12</sup> This data relates to abstractions within the RBD area. It does not cover abstractions from other RBDs which are used within the RBD (and vice versa) as a result of bulk supply arrangements.

**Table 3.1: Severn RBD abstractions**

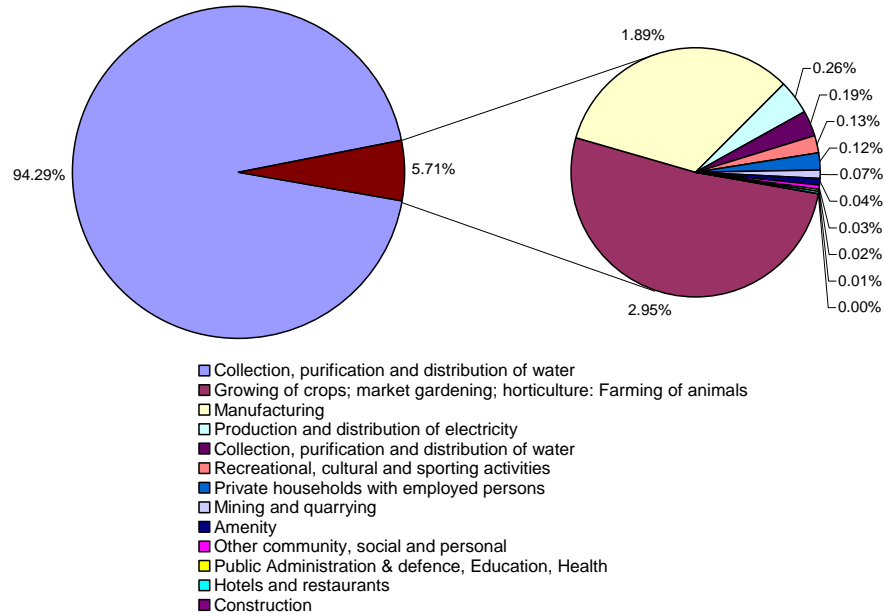
<b>SIC section</b>	<b>Abstraction source</b>	<b>Additional information</b>	<b>Volume abstracted (MI/d)</b>	<b>Percentage of Severn RBD abstractions</b>
E41.00	Collection, purification and distribution of water	Public Water Supply (total abstracted)	2323.7	94.29%
A01	Growing of crops; market gardening; horticulture: Farming of animals	Spray Irrigation included	72.7	2.95%
D	Manufacturing	General Industry (Manufacturing)	46.5	1.89%
E40.10	Production and distribution of electricity	Power Generation	6.5	0.26%
E41.00	Collection, purification and distribution of water	Licensed transfers for PWS	4.7	0.19%
O92	Recreational, cultural and sporting activities	Recreation (including sports)	3.1	0.13%
P	Private households with employed persons	Other Potable Uses	2.9	0.12%
C	Mining and quarrying	Mining & Aggregates	1.7	<0.10%
	Amenity	Amenity	1.1	<0.10%
O (excluding O92)	Other community, social and personal	Other (including Environmental)	0.6	<0.10%
L	Public Administration & defence, Education, Health	Public Administration & defence, Education, Health	0.6	<0.10%
H	Hotels and restaurants	Hotels, Public Houses and Conference centres	0.3	<0.10%
F	Construction	Construction	0.0	<0.10%
Total			2464.4	100%

Source: Environment Agency, 2001

Note: Abstractions are from freshwater bodies (i.e. they exclude tidal and coastal waters) and are not adjusted for water returned to the local environment.

Figure 3.1 provides a graphical representation of this information.

**Figure 3.1: Severn RBD abstractions**



Source: Environment Agency, 2001

### 3.1.2 Discharges

Discharges into water bodies also have important impacts on water status.

Table 3.2 below summarises the main categories of consented discharges for the Severn RBD. The table shows the number of consents rather than volumes. The major sources of discharges for the Severn RBD are related to the treatment of sewage. The number of such consents is in part a function of the number of households in the Severn RBD and the level of household water use.

**Table 3.2: Number of consented discharges for the Severn RBD**

<b>Discharge</b>	<b>Number of consents</b>	<b>Percentage of total consents</b>
Sewage – treated effluent	2268	59.09%
Sewage treatment works	1018	26.52%
Sewage – storm effluent	125	3.26%
Trade – treated effluent	121	3.15%
Trade – crude effluent	54	1.41%
Trade – site drainage (contaminated s/w)	32	0.83%
Trade – filter backwash	27	0.70%
Manufacture and use of organic chemicals	25	0.65%
Sewage – village drain	25	0.65%
Processes involving halogens	22	0.57%
Trade – fish aquaculture	18	0.47%
Iron and steel	18	0.47%
Combustion processes	12	0.31%
Chemical fertiliser production	11	0.29%
Trade – purge effluent	8	0.21%
Carbonisation and associated processes	7	0.18%
Unknown	7	0.18%
Non-ferrous metals	7	0.18%
Trade – leachate	6	0.16%
Trade – cooling water (direct)	5	0.13%
Trade – minewater	4	0.10%
Trade – groundwater – as raised	4	0.10%
Petrochemical processes	2	0.05%
Other	12	0.31%
<b>Total</b>	<b>3838</b>	<b>100%</b>

Source: Environment Agency, 2004

### **3.1.3 Hydromorphology**

Physical alterations to transitional or coastal waters can cause habitat damage or loss, resulting in a loss of, or decline in, species. These waters can be affected by land reclamation, shoreline reinforcement or physical barriers such as flood defences, barrages and sluices. Activities such as navigation, some types of commercial fishing and dredging can also damage physical habitats.

There can also be morphological alterations in inland waters, including those due to dredging, the construction of barrages and inland navigation. In addition, there are some morphological changes to facilitate land drainage including straightening, deepening and culverting.

In the Severn RBD land reclamation, shoreline reinforcing, inland navigation and fishing are significant morphological alterations. Land reclamation is human activity that may have reclaimed low-lying areas from the sea and includes coastal flood defence structures. Shoreline defences include embankments, sea walls, groynes and culverts. Areas on the coast of the Severn RBD have been impacted by commercial fishing.

There is a SIC category that covers the construction of all water projects and includes ports, jetties, lochs and dredging. This sector is quite small in the Severn RBD but is expected to grow moderately during the period from 2002 to 2015 (see Annex 2).

## 3.2 Sectors impacting on water status

The following sections provide more detail on a number of sectors which are particularly important to the water status in the Severn RBD. These are grouped in terms of households, industry and agriculture.

### 3.2.1 Households

Water companies provide water services to households, to commercial premises as well as to some industrial customers. The largest volume of water abstracted in the Severn RBD is by water companies, and future trends in the level of water demanded by water users may have important impacts on water status.

Water demand forecasts have been undertaken and incorporated into the risk assessment. In the case of the Severn RBD, forecasts related to the following companies (Dwr Cymru, Severn Trent Water, Thames Water, Wessex Water, Bristol Water and South Staffordshire Water). The forecasts are based on the World Markets scenario in the Environment Agency's water resources strategy report '*A Scenario Approach to Water Demand Forecasting*' 2001<sup>13</sup>. The risk assessment could not use water industry forecasts of demand in their *Water Resource Plans* (WRP) because of timing and confidentiality issues.

The Environment Agency's strategy forecasts, however, have been compared to the water companies' recent forecasts to validate them and highlight qualitatively any differences between the forecasts and their supporting information. In general, it was concluded that the growth rates for per capita consumption used in the Environment Agency's strategy report are higher than the growth rates used by the water companies in their final *Water Resources Plans* (WRP) in April 2004 as part of the periodic review.

The key explanation for the differences in per capita consumption growth rates in the Environment Agency's strategy report and the companies' WRPs lies in the assumptions behind the Beta scenario used in the strategy report.

The Environment Agency is reviewing how to refine these per capita water consumption projections in the near future to inform the risk assessment and the analysis of options for the PoMs. This will involve taking account of the major changes in demand forecasts in the companies' WRPs and the major anticipated changes in the agriculture sector from the Environment Agency's *Business as Usual* (BAU) agriculture projections. In addition the water implications of housing development and regeneration policies (see 'Area based initiatives') that the Government has recently announced will be examined carefully. This will also involve taking into account any other relevant forecasts, including those in this document.

<sup>13</sup> [www.environment-agency.gov.uk/subjects/waterres/286587/286599/286911/?lang=\\_e](http://www.environment-agency.gov.uk/subjects/waterres/286587/286599/286911/?lang=_e)

### 3.2.2 Industry

Manufacturing accounts for 46.5 megalitres per day of abstractions. This is the third largest source of abstractions after the public water supply and agriculture sector.

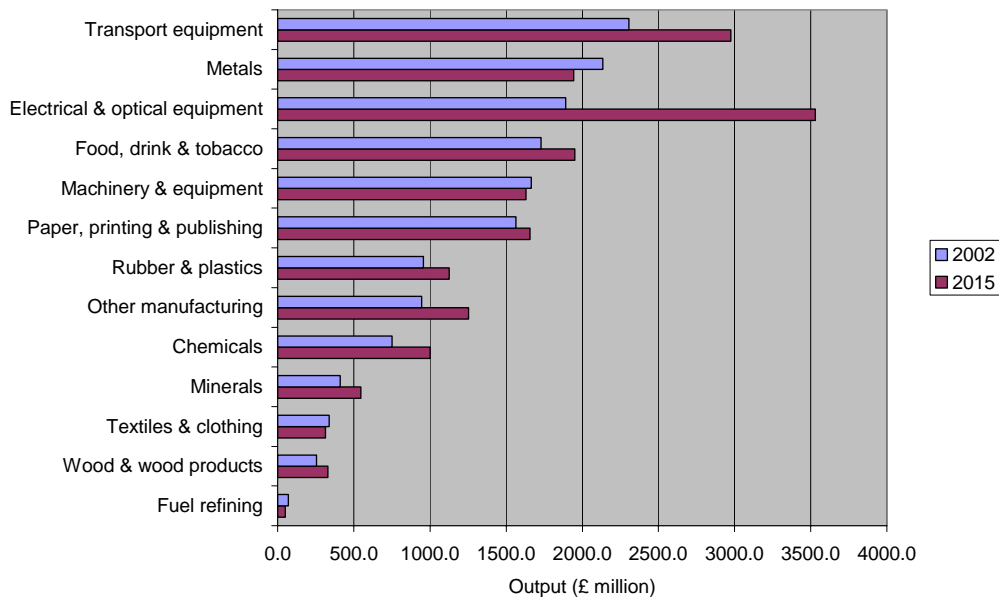
The NALD code 'Manufacturing' covers SIC codes 15-37. Output and employment data for the following broad categories has been provided by Experian Business Strategies Ltd:

- Food, drink & tobacco;
- Electrical & optical equipment;
- Transport equipment;
- Paper, printing & publishing;
- Machinery & equipment;
- Metals;
- Other manufacturing;
- Rubber & plastics;
- Textiles & clothing;
- Minerals;
- All chemicals;
- Wood & wood products; and
- Fuel refining.

Forecast manufacturing output in these sectors is indicated in Figure 3.3 below.

Between 2002 and 2015 the largest increase in manufacturing output (in value terms) is forecast to be in the Electrical & optical equipment and Transport equipment sectors. Output from the Electrical & optical equipment sector is forecast to increase by £1.6 billion. Smaller increases are expected in the more water intensive sectors, such as Food, drink & tobacco and Chemicals. The overall impact of these changes on water use is difficult to ascertain as changes in production techniques could have more significant impacts on water abstractions and discharges.

**Figure 3.2: Forecast change in manufacturing output, Severn RBD 2002-2015**



Source: Experian Business Strategies Ltd

The Severn RBD contains some important ports, including Bristol and Cardiff. Shipping relies on safe access to water of an adequate depth for access to markets. Some ports have statutory duties to maintain waters to specified depths and undertake dredging activities to maintain and deepen channels. Ports and marinas can be directly affected by discharges upstream, leading to water quality issues. In some cases, navigation by vessels may also influence water quality. Abstractions upstream can have potential impacts on port water levels, leading to navigational issues in some instances.

Ports and marinas undertake an extremely broad range of activities. Cargo and passenger handling are the most important but ports also supply services to industries such as oil and fishing. Marinas can have a major influence on tourism activity. Ports and marinas provide important regional infrastructure supporting local economies and businesses.

Ports handle approximately 95 per cent of UK trade in tonnage terms. Domestic coastal freight services contribute to reducing road congestion and provide a more environmentally friendly mode of transport than road or rail. A major concern to the transport industry is the lack of additional deep-water container port capacity in the UK. The UK port industry expects that overall tonnage handled at the UK's ports will, at least, continue to grow in line with GDP for the foreseeable future. This will necessarily require further sustainable development, dredging and disposal of dredged materials.

Nationally, the ports industry has direct employment of approximately 25,000 and it is estimated that a further 380,000 jobs are indirectly dependant on port activity.

Table 3.3 details the goods and passenger movements through ports in the Severn RBD. The Severn RBD does not have a high level of port usage compared to other RBDs.

**Table 3.3: Port foreign and domestic traffic, passenger movements in the Severn RBD**

	Flow (000s tonnes)	Percentage of all RBD port movement	RBD rank
<b>Goods In 2002 (000 tonnes)</b>	13 491	4.93%	8 <sup>th</sup>
<b>Goods Out 2002 (000 tonnes)</b>	2 476	1.75%	9 <sup>th</sup>
<b>All foreign &amp; domestic traffic 2002 (000 tonnes)</b>	15 967	3.91%	8 <sup>th</sup>
<b>Passenger movements 2002 (000s)</b>	N/A	N/A	N/A

Source: British Ports Association

The main ports within the Severn RBD include:

- Bristol – throughput (2002) of 10,083,000 tonnes;
- Newport – throughput (2002) of 3,111,000 tonnes; and
- Cardiff – throughput (2002) of 2,209,000 tonnes.

Bristol handles mainly bulk and general cargo with some containerised traffic and is second largest in terms of motor vehicle trade. Cardiff and Newport traffic comprises bulk and general cargo.

There are both coastal and inland marinas in the Severn RBD, of note along the Bristol Channel, the Kennet and Avon Canal, the River Avon, the River Wye and the River Severn.

A British Marine Federation report on marinas and moorings for both inland and coastal sectors illustrated that the demand for moorings exceeds the supply in coastal waters. For inland waters, there is a strong demand for moorings for current and mid term requirements, with current waiting lists indicating an overwhelming demand for power moorings.

Output forecasts have been conducted by Experian Business Strategies Ltd under the following relevant categories:

- Sea and coastal water transport (covering passenger sea and coastal water transport and freight sea and coastal water transport); and
- Inland water transport.

In the Severn RBD output from sea and coastal water transport is forecast to increase from £11.1 million in 2002 to £15.2 million in 2015. This is an increase of 15.2 per cent.

Output from inland water transport is also forecast to grow from £2.1 million in 2002 to £2.8 million in 2015.

### 3.2.3 Agriculture

The Agriculture sector has the potential to impact on water quality in a number of ways. Agriculture is an abstractor of water, as well as a source of diffuse pollution (mainly nitrates, phosphates and pesticides). Diffuse pollution can impact on water courses and water bodies. Static waters can be particularly vulnerable. Sediment run-off can also impact on hydromorphology.

There are two sources of forecasts for the agricultural sector: forecasts undertaken by Cambridge University and those by Experian Business Strategies Ltd.

The Experian forecasts are based on output for SIC categories. A brief summary of the methodology used is found in Annex 2. The forecasts predicted an overall increase in agricultural production over the period between 2002 and 2015. An average increase in output of 0.2 per cent per annum is forecast over this period.

An in-depth agriculture *Business as Usual* study for the WFD was undertaken by Cambridge University (ref 2). The study provides quantitative percentage changes of key agricultural activities to 2015 at a national level and at a regional level for Government Office Regions in England and for Wales (see Tables 16-18). The report used a top down approach, essentially looking at overall changes in England and Wales and adjusting these based on knowledge of the region and expert opinion to reflect regional changes.

The projections are based on a hybrid approach involving projections of current trends (adjusted for known developments in the drivers), institutional projections, available models, expert opinion, stakeholder meetings and a peer review process. The impacts of a wide range of drivers are considered including market forces, political (including *Common Agricultural Policy* reform), rationalisation within the industry, technological change and macroeconomic factors.

The Severn RBD includes the following Government Office Regions: Wales, South West and West Midlands. The key projected trends for major commodities in the Severn RBD are:

- Removal of set-aside brings land into arable production;
- Small increase in cereal production (particularly wheat, oilseed rape and maize) due to set aside changes;

- Continued decline of dairy herd as yields increase;
- Decline in beef and sheep herds; and
- A continued decline in horticultural crops (especially sugar beet and potatoes).

Overall a small fall in agricultural area is predicted. However, this may hide potentially significant changes in the structure and intensification of the industry and how businesses are managed. This may have impacts on water quality. For instance, more intensive cropping through greater use of fertilisers may impact on diffuse pollution.

In the future, in order to inform the development of the PoMs, the Environment Agency hopes to refine these projections to reflect differences within RBDs and important local aspects such as changes in intensity of farming methods. This future work will provide the basis for local baseline risk assessment and for the appraisal of options for water bodies at risk of not meeting good ecological status due to agricultural activities. The projections will then be refined and developed so that they can be applied at a local level.

## **4 Water services and cost recovery**

### **4.1 Introduction**

The WFD aims to ensure that pricing policies improve the sustainability of water resources and requires pricing policies to perform the following functions by 2010:

- Take account of the principle of the recovery of the costs of water services, including environmental and resource costs,
- Embody the polluter pays principle,
- Provide adequate incentives to use water resources efficiently, and
- Ensure that water use groups (separated into at least industry, households and agriculture) make an adequate contribution to the costs of water services.

The Government's view, expressed in previous consultations on the WFD, is that there is no need at present to alter present pricing policies to meet the requirements of the WFD. The present arrangements deliver charges by water and sewerage undertakers that recover the costs of these services, both overall and by sector of customer. This system takes account of the principles and objectives of the WFD and the provisions of Article 9 in particular.

However, as revealed by the CRIP report (ref 3) this is not the same as recovery of cost by broad user group (households, industry and agriculture). It is not currently possible, given existing data and bearing in mind the cost of additional data collection, to identify recovery of costs of water uses by these water user groups. In addition, some of the costs imposed by water uses (such as diffuse pollution from roads, agriculture etc.) may not be adequately recovered from the relevant users but further research is required to establish this.

Additional work is planned in relation to the recovery of financial costs and in relation to environmental and resource costs ahead of the 2010 deadline for demonstrating an adequate recovery of costs of water services.

Article 5 requires that future pricing policies will be further informed by the economic analysis of water use undertaken in accordance with Annex III of the WFD. This section provides information on the current levels of the recovery of the costs of water services in the Severn RBD to assist in this process<sup>14</sup>. The following sections outline:

- How water services are defined and how they relate to the Severn RBD;
- Who provides and who contributes to the cost of water services (users and polluters) in the Severn RBD;
- The current level of financial cost incurred in providing these services;
- The current level of environmental and resource costs associated with providing the services;
- The revenues of water services and how costs are recovered;
- Given the revenues and costs, the overall level of financial cost recovery; and
- Within this overall recovery of costs how the costs are allocated between broad user groups.

The information provided in this section is based on the CRIP report (ref 3) which is available to download from the Defra website.

<sup>14</sup> This section follows the guidance (Information Sheet) produced by France/UK/Commission on behalf of Drafting Group ECO1 under the auspices of Working Group 2B of the Common Implementation Strategy. The information sheet builds on the WATECO guidance published in 2002. The section draws on research undertaken in January to September 2004 by ERM on behalf of the England and Wales Economic Advisory Stakeholder Group (EASG) and with input from members of the UK wide Economics Steering Group.

## 4.2 Water services and the Severn RBD

Water Services are defined by the WFD as set out in Box 4.1.

### Box 4.1: Definition of water services

“All services which provide, for households, public institutions or any economic activity:

(a) abstraction, impoundment, storage, treatment and distribution of surface water or groundwater;

(b) waste-water collection and treatment facilities which subsequently discharge into surface water.”

Source: WFD Article 2 Paragraph 38

In England and Wales the definition of water services encompasses the water industry together with activities providing similar services. For the sake of transparency, it is also important to consider self-services in addition to water services.

Six water companies operate in the Severn RBD. The estimated proportion of each company's customer households falling within the Severn RBD is provided in brackets:

- Dwr Cymru (45.5 per cent);
- Severn Trent Water (35.2 per cent);
- Thames Water (5.0 per cent);
- Wessex Water (10.0 per cent);
- Bristol Water (98.0 per cent); and
- South Staffordshire Water (1.0 per cent).

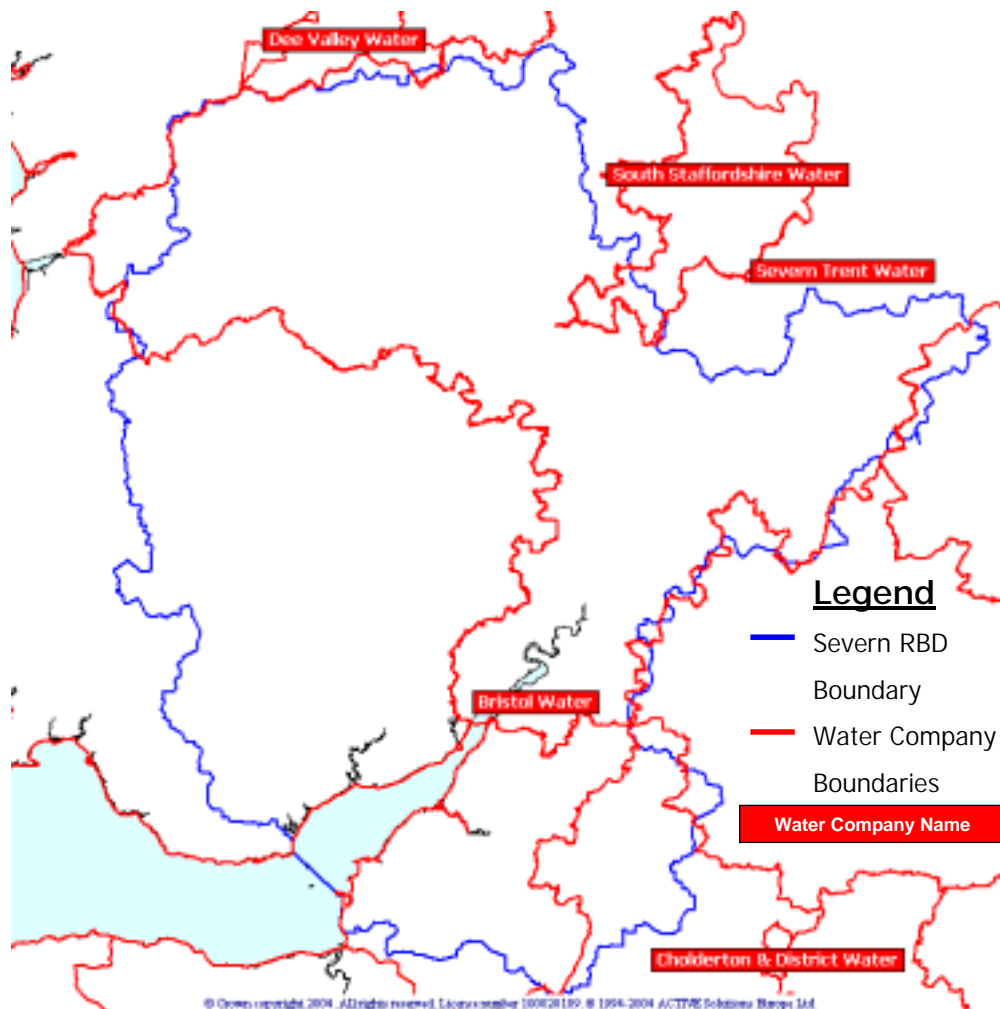
There are three sewerage service companies operating in the Severn RBD. The estimated proportion of each company's customer households falling within the Severn RBD is provided in brackets:

- Dwr Cymru (42.3 per cent);
- Severn Trent Water (33.6 per cent); and
- Wessex Water (43.5 per cent).

The water service areas of these companies do not coincide with the Severn RBD. For instance the majority of Bristol Water customers are within the

Severn RBD, with a small proportion of Thames Water and South Staffordshire customers.

**Figure 4.1: Water company boundaries, Severn RBD**



Ultimately the analysis of cost recovery needs to be undertaken at a RBD scale, however for Article 5 reporting it is possible to report rates of cost recovery on the basis of water service areas. Hence in the following analysis of cost recovery in the Severn RBD, figures are presented for all water companies. In addition an indicative “RBD allocation” is provided. This is based on a simple pro-rata allocation and may not reflect well the actual costs and revenues associated with particular geographic areas. It is provided for indicative purposes only.

## 4.3 Water service providers, users and polluters

### 4.3.1 Service providers

Dwr Cymru, Severn Trent Water, Thames Water, Wessex Water, Bristol Water and South Staffordshire Water all provide water services within the Severn RBD. Details of the services provided can be found in the CRIP report (water sources, treatment works, length of mains, sewage loads and facilities etc.). In addition information related to business plans, investments, costs and prices for the period 2005-2010 can be found in Ofwat's *Future Water and Sewerage Charges 2005-10: Final Determinations* report<sup>15</sup>.

In addition to the water service companies in the Severn RBD listed above, there is a range of private water and sewerage services. Private water services cover any water service that is not supplied by a statutory water or sewerage undertaker<sup>16</sup>. In addition to private water services there are also self-services.

In the United Kingdom, private water supplies are governed by the *Private Water Supplies Regulations 1991* which transpose the 1980 *European Drinking Water Directive* (80/779/EEC) in relation to private water supplies. These regulations place responsibilities on local authorities to monitor and improve private supplies to reflect the number of private water supplies in a particular area and the specific priorities of the local authority.

Recent local authority surveys are inconclusive about the likely extent of private water supplies in England and Wales. The estimated number of supplies ranges between 50,000 to 100,000 and the population served between 300,000 to 1 million, with this concentrated in rural locations. A majority of supplies for domestic water use purposes (about 70 per cent) serve single properties. Larger commercial uses of private supplies are concentrated in the Food & drink manufacturing sector.

Recent analysis of the 2001 *English House Condition Survey* also suggests around 700,000 household properties in England are not connected to the mains supply for drinking water purposes.<sup>17</sup> Based on typical household occupancy this would suggest a population of around 1.5 million do not receive mains water supply. No comparable estimates are currently available for the Severn RBD and data at the level of regional Government Offices is not easily mapped to the boundaries of the RBD. However, data at the level of local authorities does indicate pockets within the Severn RBD where the proportion of households not connected to mains water supplies is high. For example, Worcestershire (17 per cent), Telford and Wrekin (14 per cent) and Shropshire (5.4 per cent). These local authority areas have significant rural populations.

<sup>15</sup> [http://www.ofwat.gov.uk/aptrix/ofwat/publish.nfs/Content/pr04FD\\_CompanyLetters](http://www.ofwat.gov.uk/aptrix/ofwat/publish.nfs/Content/pr04FD_CompanyLetters)

<sup>16</sup> The approach to defining water services is set out in the *Cost Recovery and Incentive Pricing* report (ref 3).

<sup>17</sup> *Private water services and self-services: A review of current information and trends for England and Wales*, report for DEFRA; Stone & Webster Consultants; January 2005.

One example of a significant private supplier is British Waterways, which has sold water to canal-side industries for over 100 years. British Waterways operates an important network of canals in the lower reaches of the River Severn and in the West Midlands. Watergrid is a British Waterways' joint venture that uses the country's network of inland waterways to provide water services to industry, agriculture and developers. In many cases the water is returned to the canal. Further information on the British Waterways can be found in the Stakeholder Template in the *Economic Importance and Dynamics of Water Use* report (ref 1).

Private sewerage can involve the collection of wastewater, the treatment of sewage effluents and the discharge of treated wastewater to water-courses and the safe disposal of sludge (waste products from treatment processes). It has been estimated that there are between 80,000 to 200,000 km of private sewers in England and Wales and nearly half of all household properties are served by private sewers or lateral drains.<sup>18</sup> The vast majority of private sewer connections ultimately discharge wastewater to the public sewerage network.

Septic tanks and cesspools represent the most common form of private sewerage for household properties that are not connected to the public network. It is estimated that around 400,000 (1.9 per cent) household properties in England are served by septic tanks, cesspools or private sewerage systems. No direct estimates are currently available for the Severn RBD, nor is there a broadly equivalent Government Office Region. Sample data at the local authority level highlights a number of areas within the Severn RBD where these types of private drainage connection are a high proportion of overall connections. For example, the highest concentrations of private sewerage connections are located within the Severn RBD (Shropshire (18 per cent) and Herefordshire (16 per cent)).

Within the manufacturing and industrial sectors, private and in particular self-services are well established in respect of effluent treatment and disposal. One direct measure of this is provided by Environment Agency data on the direct discharge of effluent to watercourses (which requires authorisation by the Environment Agency in the form of discharge consents). These are collectively termed trade discharges as opposed to discharges from treatment works operated by sewerage companies.

About 30 per cent of total consented discharges in England and Wales are made by trade sources. The equivalent figure for the Midlands Environment Agency region is 28 per cent. Consent compliance is lower for trade discharges compared to sewage discharges.

Further work on identifying the characteristics of private water suppliers is ongoing. In particular, the information collected is not currently at the correct

<sup>18</sup> A lateral drain is part of a private drain or sewer that is located beyond the curtilage of the property to connect it to the public sewer. The curtilage is the normal boundary between private drains and the public sewer.

geographical basis to provide more detailed information in this report. In general, the abstractions and discharges from industries other than the public water suppliers (see Tables 3.1 and 3.2) are related to private abstractions and discharges, including self-service water users.

### 4.3.2 Water users

Water use is defined by the WFD as set out in Box 4.2.

#### Box 4.2: Definition of water use

“Water use” means water services together with any other activity identified under Article 5 and Annex II having a significant impact on the status of water.

Source: WFD Article 2 Paragraph 39

Article 9 of the WFD specifies that the water uses should be disaggregated into at least households, agriculture and industry.

An attempt is made as far as possible to report the information on water uses into these categories, however some uses cannot be disaggregated in this way and this will need to be subject to further analysis. This further work will also consider the appropriate sub-categorisation in the context of water pricing and PoMs. Current sub-categorisation is on the basis of the uses identified in the impacts and pressures analysis.

Some water uses, such as land reclamation, drainage etc. do not fit easily within the categories of households, industry and agriculture. As recognised in the reporting guidance it is necessary to include these “other uses” which are identified on the basis of the *River Basin Characterisation*.

#### **Households and non-households (commercial properties)**

These are the customers of the licensed water undertakers (including some commercial, non-household), other providers and households with private water supply and wastewater systems.

Tables 4.1a and 4.1b below provide the number and population of households and non-households receiving water and sewerage services from the main water service providers, as well as the volume (Ml/day).

There are estimated to be 2.0 million households and 176,000 non-households provided with water services by water companies in the Severn RBD.

**Table 4.1a: Characteristics of water services**

Company	H/holds	Non-h/holds	Population (h/holds)	Population (non-h/hold)	Volume
	('000)	('000)	('000)	('000)	(MI/day)
Bristol Water	444	41	1,019	38	293
Severn Trent Water	3,050	250	7,143	138	1,967
South Staffordshire Water	509	42	1,230	3	338
Thames Water	3,244	247	7,830	309	2,874
Dwr Cymru	1,207	113	2,795	55	876
Wessex Water	487	55	1,072	139	379
<b>Total</b>	<b>8,940</b>	<b>748</b>	<b>21,088</b>	<b>682</b>	<b>6,728</b>
<b>Allocated to Severn RBD</b>	<b>2,041</b>	<b>176</b>	<b>4,761</b>	<b>120</b>	<b>1,409</b>

Source: Annual Returns submitted by water companies to Ofwat

There are estimated to be 2.1 million households and 155,000 non-households provided with sewerage services by water companies in the Severn RBD.

**Table 4.1b: Characteristics of sewerage services, 2003-04**

Company	A:	B:	C:	D:	E:
	H/holds	Non-h/holds	Population (h/holds)	Population (non-h/hold)	Volume
	('000)	('000)	('000)	('000)	(MI/day)
Severn Trent Water	3,367	259	8,189	676	1,620
Dwr Cymru	1,199	74	2,990	300	566
Wessex Water	973	84	2,475	54	517
<b>Total</b>	<b>10,487</b>	<b>710</b>	<b>26,288</b>	<b>1,457</b>	<b>5,723</b>
<b>Allocated to Severn RBD</b>	<b>2,062</b>	<b>155</b>	<b>5,093</b>	<b>378</b>	<b>1,009</b>

Source: Annual Returns submitted by water companies to Ofwat

### **Industry – trade effluent and large users**

These are the large user (water and sewerage) and trade-effluent customers (including some agriculture) of the licensed water undertakers, plus direct industrial dischargers and abstractors, plus the customers of other third party water services. Tables 4.2a, 4.2b and 4.2c summarise the numbers of customers and volumes for large volume water users, trade effluent and large volume sewerage service users for each of the water services in the RBD. The tables also note the number of customers and volumes associated with special agreements. This information is provided on a water service area basis as an RBD allocation of trade effluent and large users is not possible given there is no currently adequate variable for apportioning data (unlike population in the case of households).

**Table 4.2a: Large users (>50MI pa) and special agreements; water**

<b>Company</b>	<b>Customers</b>	<b>Water delivered (MI pa)</b>	<b>Special agreement customers</b>	<b>Special agreements water delivered (MI pa)</b>
Welsh Water	127	23,057	14	25,533
Severn Trent Water	273	41,675	1	4,251
Thames Water	307	31,358	29	19,339
Wessex Water	60	5,207	14	6,218
Bristol Water	52	8,042	2	4,006
South Staffordshire Water	35	7,316	0	0

**Table 4.2b: Large users (>50MI pa) and special agreements; trade effluent**

<b>Company</b>	<b>Customers</b>	<b>Trade effluent (MI pa)</b>	<b>Special agreement customers<sup>1</sup></b>	<b>Special agreements trade effluent (MI pa)<sup>1</sup></b>
Dwr Cymru	62	14,703	1	639
Severn Trent Water	194	31,505	0	0
Wessex Water	39	2,686	22	3,921

**Table 4.2c: Large users (>50MI pa) and special agreements; sewerage**

<b>Company</b>	<b>Customers</b>	<b>Sewage collected (MI pa)</b>	<b>Special agreement customers<sup>1</sup></b>	<b>Special agreements sewage collected (MI pa)<sup>19</sup></b>
Dwr Cymru	56	2,197	0	0
Severn Trent Water	276	13,575	0	0
Wessex Water	95	3,093	21	1,012

## **Agriculture**

These are the agricultural customers of the licensed water undertakers, as well as those that directly abstract water for agricultural purposes. Direct abstractions from the agriculture sector make up around 13 per cent of all abstractions in England and Wales, with the fish farming sector accounting for most abstractions.

<sup>19</sup> Consumption per annum is not specified as above 50MI for these customers.

## Other

These are users that do not fit into the above categories, such as transport, infrastructure etc.

### **4.3.3 Polluters**

There are different types of pollution in the context of the WFD and it is useful to identify polluters who give rise to increased costs of providing water services. This is a technically difficult area and a large number of assumptions are required to arrive at an answer. The approach adopted is explained in the CRIP report (ref 3).

Data reported by the water companies to Ofwat can be used to identify some costs that can be associated with polluting activities. In the case of water supply the companies' costs reflect capital and operating expenditure on nitrate and pesticide removal, removal of other contaminants (metals, phosphates, soil, arsenic) and reducing the risk of *Cryptosporidium*.

Table 4.3 summarises the capital and operating expenditure in terms of annualised costs. The table also provides an indicative estimate of the proportion of these annual costs which is attributable to external sources, in this case the agricultural sector<sup>20</sup>.

The estimates suggest that currently around £326.7m of annual remediation cost is incurred by water companies to deal with standards on nitrate removal, pesticide removal, other contaminants and *Cryptosporidium* risks. This equates to about 10 per cent of total public water supply costs in these companies. About £227.5m of this is attributable to the external impacts of the agricultural sector on raw water quality. Based on the population allocation procedure, around £24.8 million of these costs arise within the Severn RBD itself.

The following table shows that water treatment capital expenditure has been and continues to be a significant proportion of the total capital expenditure for water quality enhancements. The balance of this expenditure has been shifting from issues such as nitrate and pesticide removal to the reduction of *Cryptosporidium* risks.

<sup>20</sup> Pretty (2000) provides the source for the assumptions on the shares attributable to this sector.

**Table 4.3: Estimated annual costs in 2002-03 associated with external impacts on raw water quality (£m, 2002-03 prices)**

	Annual costs borne by water company customers £m pa	Contribution due to external sources	Total annual remediation costs attributable to external sources	Costs allocated to the Severn RBD £m pa
<b>Capital Costs</b>				
Nitrates	18.1	80%	14.5	1.8
Pesticides	72.1	89%	64.2	2.8
Other parameters	126	50%	63.0	11.2
<i>Cryptosporidium</i>	37.2	90%	33.5	1.5
<b>Subtotal</b>	<b>253.4</b>		<b>175.1</b>	<b>17.1</b>
<b>Opex</b>				
Deteriorating raw water quality	64.7	69%	44.6	6.6
<i>Cryptosporidium</i>	8.6	90%	7.7	1.3
<b>Total</b>	<b>73.3</b>		<b>52.4</b>	<b>7.7</b>
<b>Grand total</b>	<b>326.7</b>		<b>227.5</b>	<b>24.8</b>

Source: CRIP report (ref 3)

For the sewerage service one of the key sources of pollution giving rise to elevated costs is diffuse run-off containing hazardous substances received at sewage treatment works. Hazardous substances may also be present in urban drainage and sewers where substances are inappropriately disposed of, or indeed released by households in their legitimate use of, for instance, cleaning products. It is not presently possible to quantify the level of costs involved. The sectors responsible for these costs are domestic (disposal of household and DIY chemicals or use of products containing hazardous substances) manufacturing, transport and construction. These sectors contribute differently towards the recovery of those costs with households and industries that are customers of sewerage companies bearing the treatment costs.

## 4.4 Current financial costs of water services

The financial costs of the water and sewerage service companies operating in the Severn RBD are summarised in Tables 4.4 and 4.5. These costs include the remediation costs identified above. Costs and figures in Tables 4.4 through to 4.7 are based on work done for the CRIP report and information collated by Ofwat from water companies.

In 2003-04 the financial costs of the water and sewerage services were £367.8 million and £351.7 million for the Severn RBD. These are based on population allocation.

**Table 4.4: Public water supply: total financial costs; Severn RBD (£m, 2003-04 prices)**

Water company	Percentage of pop in RBD	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04
Dwr Cymru	45.5%	264.7	249.9	238.4	238.0	229.7	221.6
Severn Trent Water	35.2%	462.4	489.1	473.5	468.2	467.2	470.7
Thames Water	5.0%	498.7	502.0	466.5	484.6	481.9	487.2
Wessex Water	10.0%	96.6	99.0	83.7	86.6	85.4	89.2
Bristol Water	98.0%	71.9	74.9	67.5	69.8	70.1	68.8
South Staffordshire Water	1.0%	64.6	65.1	62.0	60.9	59.8	59.8
<b>Total allocated financial costs</b>		<b>388.9</b>	<b>394.9</b>	<b>373.6</b>	<b>375.0</b>	<b>370.9</b>	<b>367.8</b>

Source: Ofwat

**Table 4.5: Sewerage service: total financial costs; Severn RBD (£m, 2003-04 prices)**

Water company	Percentage of pop in RBD	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04
Dwr Cymru	42.3%	242.9	269.4	230.5	241.0	243.1	242.2
Severn Trent Water	33.6%	605.0	594.1	475.8	474.1	472.1	495.3
Wessex Water	43.5%	194.5	200.4	180.2	184.1	184.6	190.3
<b>Total allocated financial costs</b>		<b>390.6</b>	<b>400.7</b>	<b>335.8</b>	<b>341.3</b>	<b>341.7</b>	<b>351.7</b>

Source: Ofwat

The following tables summarise the unit financial costs of the companies operating in the Severn RBD for the water and sewerage service. The table shows an indicative, population based allocation of these unit costs. In 2003-04 the unit water supply cost was £0.79 per m<sup>3</sup> and for the sewerage service £0.96 per m<sup>3</sup>.

**Table 4.6: Public water supply: unit financial costs; Severn RBD (£/m<sup>3</sup>, 2003-04 prices)**

Water Company	Percentage of pop in RBD	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04
Dwr Cymru	45.5%	1.04	1.01	0.96	0.97	0.93	0.91
Severn Trent Water	35.2%	0.78	0.81	0.79	0.78	0.79	0.78
Thames Water	5.0%	0.72	0.67	0.61	0.63	0.62	0.61
Wessex Water	10.0%	0.87	0.89	0.76	0.77	0.76	0.77
Bristol Water	98.0%	0.77	0.82	0.75	0.76	0.78	0.76
South Staffordshire Water	1.0%	0.64	0.65	0.61	0.59	0.58	0.57
<b>Total allocated financial costs</b>		<b>0.84</b>	<b>0.85</b>	<b>0.81</b>	<b>0.81</b>	<b>0.81</b>	<b>0.79</b>

Source: Ofwat

Note: Unit financial costs for 2003/04 in this report might differ from those in Ofwat's *Unit Costs and Relative Efficiency 2003-04* reports. This is because of different assumptions used in the two reports in eliciting the financial cost. For more information contact [www.ofwat.gov.uk](http://www.ofwat.gov.uk).

**Table 4.7: Sewerage service: unit financial costs; Severn RBD (£/m<sup>3</sup>, 2003-04 prices)**

Water Company	Percentage of pop in RBD	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04
Dwr Cymru	42.3%	1.18	1.32	1.12	1.16	1.19	1.17
Severn Trent Water	33.6%	1.07	1.04	0.84	0.84	0.89	0.84
Wessex Water	43.5%	1.11	1.14	1.02	1.02	1.05	1.01
<b>Total allocated financial costs</b>		<b>1.11</b>	<b>1.13</b>	<b>0.95</b>	<b>0.95</b>	<b>0.99</b>	<b>0.96</b>

Source: Ofwat

Note: Unit financial costs for 2003/04 in this report might differ from those in Ofwat's *Unit Costs and Relative Efficiency 2003-04* reports. This is because of different assumptions used in the two reports in eliciting the financial cost. For more information contact [www.ofwat.gov.uk](http://www.ofwat.gov.uk).

Some of the financial costs incurred by the water companies are aimed at improving water quality.

Since privatisation in 1989 water companies in England and Wales have incurred capital and operating expenditure in order to mitigate the environmental impacts of the sewerage services and to investigate and alleviate the impacts of their abstractions on the aquatic environments. Ofwat has analysed the sewerage services costs on a RBD level and Table 4.8 illustrates the Severn RBD results.<sup>21</sup> Column 1 shows the percentage of the water companies costs which are attributed (on an indicative basis) to the RBD. Column 2 shows the capital expenditure recorded as being spent on

<sup>21</sup> Note that the results are sensitive to the assumptions that Ofwat adopted in its analysis.

environmental mitigation of sewerage services In Dwr Cymru these have amounted to £1.4 billion between 1989 and 2003. Column 3 shows the incremental annual costs associated with operating these assets (operating expenditure and capital charges). Column 4 and 5 show the figures on the basis of the Severn RBD. As the table shows, total capital expenditure incurred in the Severn RBD is in the region of £1.3 billion. Taken together with the operating expenditure this means that around £111 million per annum of the water service providers' costs are associated with mitigating environmental impacts of sewerage services.

**Table 4.8: Environmental mitigation expenditure/costs**

Company	Percentage of company costs allocated to RBD	Capex (1989-2003)- £m	Cost pa £m	Capex allocated (1989-2003) £m	Cost pa-allocated- £m
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4=1*2</b>	<b>5=1*3</b>
Dwr Cymru	42%	1,430	124	605	52
Wessex Water Services Ltd	44%	732	58	318	25
Severn Trent Water Ltd	34%	1,191	100	400	34
<b>Total</b>				<b>1,323</b>	<b>111</b>

## 4.5 Revenues and financial cost recovery

The identified water service providers recover the costs of providing water services from customers within their water service areas.

The structure of charges in the water companies varies. Where metering is in place tariffs (for both water and sewerage services) have two components: a standing charge which is irrespective of consumption and is the same for all customers on the tariff; and a volumetric charge, which varies according to how much water is consumed.

Unmeasured tariffs (for both water and sewerage services) usually comprise a fixed charge, which includes the customer related costs of supply; and a rateable value (RV) related charge (based on the monthly rental value of the property). The structure varies with the water company and zones or geographical districts, for example some water companies do not charge a fixed fee, whereas others only have a fixed charge. In all cases, the amount unmetered customers pay is not related to levels of water consumption. Detailed information on these tariffs for the relevant water companies operating in the Severn RBD can be found in the *Ofwat Tariff Structure and Charges 2004 – 2005* report<sup>22</sup>.

The breakdown of metered and non-metered households for 2003-04 and 2009-10 are given in Tables 4.9a and Table 4.9b below. These tables present metering information for all water and sewerage companies operating in the Severn RBD, rather than for all households and non-households in the Severn RBD. As such, the tables provide only indicative information on the level of metering in the Severn RBD.

**Table 4.9a: Percentage of water and sewerage customers taking metered supplies: 2003-04**

Severn RBD	Dwr Cymru	Severn Trent Water	Thames Water	Wessex Water	Bristol Water	South Staffs Water
<b>Water</b>						
Household %	16.5	22.9	19.7	30.6	20.6	13.9
Non-household %	86.4	92.6	87.5	85.1	80.4	85.5
<b>Sewerage</b>						
Household %	17.4	21.5	19.2	25.0		
Non-household %	82.8	91.5	84.3	83.4		

Source: Ofwat, Tariff Structure and Charges 2004-05

<sup>22</sup> Available at [www.ofwat.gov.uk/aptrix/ofwat/publish.nsf/AttachmentsByTitle/tariff\\_report04.pdf/\\$FILE/tariff\\_report04.pdf](http://www.ofwat.gov.uk/aptrix/ofwat/publish.nsf/AttachmentsByTitle/tariff_report04.pdf/$FILE/tariff_report04.pdf)

**Table 4.9b: Percentage of water and sewerage customers taking metered supplies: 2009-10**

Severn RBD	Dwr Cymru	Severn Trent Water	Thames Water	Wessex Water	Bristol Water	South Staffs Water
<b>Water</b>						
Household %	31.9	30.5	27.1	45.6	30	21.4
Non-household %	88.5	92.7	88.4	87.6	90.4	92.9
<b>Sewerage</b>						
Household %	33.5	29.3		38.7		
Non-household %	85.9	92.4		87.3		

Source: Ofwat, Tariff Structure and Charges 2004-05

Revenue in the companies arises from the provision of a range of services which make up the overall water service. These include measured and unmeasured charges for:

- Water consumption;
- Sewerage and trade effluent;
- Surface water and highway drainage; and
- Connection.

There are also a variety of other minor charges discussed in the CRIP report. For each of the charges, the cost recovery mechanism is slightly different but for each source of charge income, prices are generally cost reflective.

Tables 4.10 and 4.11 are based on work done for the CRIP report, which found that cost recovery was generally around 100 per cent<sup>23</sup>. These tables have been updated for more recent data collected by Ofwat in annual water company returns.

In any specific year, because of the five year regulatory cycle, water companies' total costs and revenues do not always match exactly. Broadly speaking, this is because the revenue profile is closely related to the economic regulator's (Ofwat) assumptions on companies' costs (e.g. depreciation of assets, investments' time profile, specific levels of operating expenditure) when setting the price limits at Final Determinations and on projected *status quo* revenues.

Companies' incurred costs may also differ in any given year from those assumed by Ofwat, giving rise to discrepancies between costs and revenues. Furthermore, changes, for instance in the assumptions underpinning revenue

<sup>23</sup> The approach to defining the cost recovery rate is explained in the report on *Cost Recovery and Incentive Pricing* report (ref 3). This is a complicated area, but in very general terms the rate is defined as revenues less subsidies divided by cost.

projections used at Final Determinations, could result in lower revenues than expected and thereby create an imbalance between total costs and revenues in specific years.

Under the economic regulatory regime in England and Wales, a balance between costs and revenues should nonetheless be achieved over a longer time horizon.

The licensed providers of water and sewerage services are totally financed by revenues from customers although in some years, some water companies receive grants (subsidies) from, for instance, the European Community. These however are negligible (they are generally well below 1 per cent of total costs for any specific year). In addition such subsidies are dealt with in the price setting process so that that they do not affect the cost recovery rate as reported in Tables 4.10 and 4.11.

**Table 4.10: Public water supply: cost recovery for Severn RBD (£m, 2003-04 prices)**

Cost component	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04
<b>Total revenues</b>	387.4	393.6	371.5	372.8	369.3	366.1
Subsidies	0.0	0.0	0.0	0.0	0.0	0.0
<b>Total financial costs (inclusive of taxes)</b>	388.9	394.9	373.6	375.0	370.9	367.8
<b>Cost recovery rate</b>	<b>100%</b>	<b>100%</b>	<b>99%</b>	<b>99%</b>	<b>100%</b>	<b>100%</b>

Source: Ofwat

**Table 4.11: Sewerage service: cost recovery for Severn RBD (£m, 2003-04 prices)**

Cost Component	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04
<b>Total revenues</b>	391.7	400.5	334.8	340.0	338.5	346.3
Subsidies	0.0	0.0	0.0	0.0	0.0	0.0
<b>Total financial costs (inclusive of taxes)</b>	390.6	400.7	335.8	341.3	341.7	351.7
<b>Cost recovery rate</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>99%</b>	<b>98%</b>

Source: Ofwat

Water companies (and other abstractors and dischargers) pay abstraction and discharge fees for the water they abstract to use and sell on and the discharges they make to water bodies and courses. The Environment Agency administers the abstraction and discharge licensing system for all water users, including the water and sewerage service companies. The Environment Agency levies administrative charges to recover its costs of managing water resources in line with the *Water Resources Act 1991*.

Abstraction charges are calculated according to the total volume authorised by the licence, adjusted for:

- The season of authorised abstractions;
- The 'loss factor' (or degree to which water is returned directly to the environment); and
- The degree of environmental 'support' provided to the source of abstraction.

In addition, there is an annual charge and a fee for every new or amended licence application (with the exception of a simple reduction in volume).

The discharge consents scheme includes an application charge and an annual charge. The annual charging system gives greater weight to larger volumes, more sophisticated effluents (since higher monitoring costs are incurred due to greater complexity) and the complexity of monitoring given the nature of receiving waters (sampling and analytical problems being most associated with estuaries).

The Environment Agency also recovers part of its costs in dealing with water pollution incidents from polluters.

## 4.6 Current level of environmental and resource costs

This section uses the available information to assess the environmental costs of current water pollution and abstraction in England and Wales. This provides contextual information indicating the importance of the environmental and resource costs of water use and highlights the need for their careful and serious consideration. This contextual information **cannot and should not** determine any specific measures since this will require careful appraisal of feasibility, scope and costs and benefits of reducing the environmental impacts of water use.

Environmental and resource costs arise where water uses affect water bodies and contribute to water bodies failing to achieve good status. As there is no definition of good status nor a classification scheme for it at present, it is difficult to measure the gap between current and good status and hence the level of environmental and resource costs. However, it is still possible to infer their significance.

It is possible to use the available assessment methods and information from the Overall Benefits Assessment for the current *Periodic Review of the Water Industry* (PR04) to indicate the significance of environmental and resource costs; but it should be recognised that further work is needed to update the assumptions in the existing studies.

After the implementation of the environment programme recently agreed in the *Periodic Review of the Water Industry* (PR04), the remaining quantified environmental damage costs caused by water pollution and abstraction in England and Wales will be about £1 to 1.5 billion per annum. The water industry and agriculture contribute equally to about 85 per cent of this total. Other diffuse and point sources such as diffuse urban pollution, landfill sites and contaminated land account for the remaining 15 per cent<sup>24</sup>.

These estimates do not include:

- Impacts of water pollution (other than eutrophication) on lakes;
- Impacts on fishing and recreation of abstraction in causing low flow problems in rivers and lakes; and
- Impacts of abstraction on the quantity of groundwaters.

These impacts are likely to be significant. They will be assessed as far as possible as part of the appraisal of options affecting water bodies for the draft RBMPs in 2008-09.

<sup>24</sup> For information on these estimates and the methodology applied to derive them, see *The Environmental damage costs of current water quality and flows in England and Wales and the contribution of PR04 in reducing them*; Environment Agency; 2004. Forthcoming on [www.environment-agency.gov.uk/economics](http://www.environment-agency.gov.uk/economics).

These estimates do not relate fully to the issues to be addressed in the WFD. They do not include important issues and environmental pressures identified by the *River Basin Characterisation* exercise as affecting risks of achieving good status (e.g. morphology pressures such as flood risk management, impacts on coastal and transitional waters and lakes, and release of priority hazardous substances). These issues are likely to be significant and they will be considered as far as possible as part of the appraisal of options for the draft RBMPs in 2008-09.

Due to the above factors regarding the scope of available estimates, they might underestimate the environmental and resource costs of water use. But on the other hand there are countervailing methodological and empirical reasons why they might be overestimates; as well as reasons why they might be under-estimates. More work is needed on this subject.

These estimates provide contextual information that highlights the importance of this subject and the need for its careful and serious consideration. However, on their own, they **cannot and should not** determine any specific measures since this will require careful appraisal of the feasibility and scope for reducing these environmental impacts, for which the potential costs could rise significantly to achieve greater reductions. Moreover it will require careful appraisal of the costs and benefits of the options to determine the cost-effectiveness of options across all sectors and whether the options are disproportionately costly. Being based on a pre-WFD approach to the assessment of the impacts of environmental pressures, this assessment should only be seen as an initial marker.

### **Collaborative research programme**

In this vein, various Government Departments, Agencies and stakeholders in the UK are carrying out research to develop the economic analyses and appraisal techniques for efficient implementation of the WFD. In particular, this includes a study to develop methods to assess the costs and effectiveness of options. This will build on a recent report for Defra on *Cost Effectiveness Analysis and Developing a Methodology for Assessing Disproportionate Costs* (ref 4).

This research will assess the environmental and resource costs to aid in the assessment of disproportionate costs as part of drawing up the PoMs and to aid the examination of pricing policies and the degree of cost recovery, including consideration of environmental and resource costs.

## 5 Cost-effectiveness analysis

The *Pressures and Impacts Analysis* reveals that a large number of activities contribute towards pressures in the Severn RBD. Many water bodies are at risk from multiple pressures. Information on costs and benefits, including environmental and resource costs and benefits, is needed to inform the design of cost-effective PoMs and the consideration of less stringent environmental objectives.

It is important that a common approach to assessment of cost-effectiveness and information on disproportionate costs is adopted. A method has been developed in a study entitled *Cost-Effectiveness Analysis and Developing a Methodology for Assessing Disproportionate Costs* (ref 4). Work is underway as part of the *UK Collaborative Research Programme on River Basin Management Planning Economics* (CRP) to develop this into a practical approach. The CRP is outlined in more detail in section 6.

## 6 Improving knowledge and the information base

A draft programme of work on assessing the costs and benefits of options in River Basin Management (RBM) for implementing the WFD has been developed. This is entitled the *UK Collaborative Research Programme on River Basin Management Planning Economics* (CRP).

The draft CRP builds on the three scoping studies that Defra commissioned in 2003-04:

- *Cost-Effectiveness Analysis and Developing a Methodology for Assessing Disproportionate Costs* (ref 4);
- *Cost Recovery and Incentive Pricing* (ref 3); and
- *Economic Characterisation and Dynamics of Water Use* (ref 1).

Each of these reports identified a list of actions. These actions have been prioritised, and the CRP is taking forward those that are most important for implementing the WFD.

The CRP identifies and justifies the need for research, outlines the key collaborative requirements and prioritises and schedules the research in the light of the time and likely resources available. A key feature of the process is the collaborative involvement of a wide range of stakeholders from the start.

The draft CRP has the following sequential tasks:

1. To set out an initial identification and illustration of the issues related to the economic analysis and its role in the decision making for PoMs under the WFD (2004-05);
2. To determine how to assess costs and economic impacts for each of the main types of options affecting the major sectors that will need to be appraised in RBMPs in an even handed manner (2004-05);
3. To scope and characterise the potentially disproportionately costly cases in RBMPs and the main gaps in information to draw up an appropriate process for assessing them and making best use of original and existing work to fill these gaps. This will include exploring alternative assessment methods (2005-06);
4. Focus group analyses to clearly specify environmental damages of concern in these cases (2006);
5. Development, trial and refinement of guidance on benefits assessment for RBMPs (2006-08); and
6. New studies to provide better assessments and related demand information of the major environmental benefits of RBMPs (2006-08).

A more detailed summary of the projects is available from the Defra website<sup>25</sup>.

<sup>25</sup> <http://www.defra.gov.uk/environment/water/wfd/economics/index.htm>

## 7 References

1. *Economic Importance and Dynamics of Water Use Relevant for River Basin Characterisation (England and Wales) Final Report*; July 2004;  
(<http://www.defra.gov.uk/environment/water/wfd/economics/pdf/userreport.pdf>)
2. *Business as Usual Projections of Agricultural Outputs*; Final Report for Environment Agency; Centre for Rural Economics Research; University of Cambridge; July 2004 ([http://www.environment-agency.gov.uk/commondata/103599/busiasusualwfd\\_854912.doc](http://www.environment-agency.gov.uk/commondata/103599/busiasusualwfd_854912.doc))
3. *Assessing Current Levels of Cost Recovery and Incentive Pricing*; Defra; August 2004;  
(<http://www.defra.gov.uk/environment/water/wfd/economics/pdf/cripreport.pdf>)
4. *CEA and Developing a Methodology for Assessing Disproportionate Costs; Final Report*; Defra; July 2004  
(<http://www.defra.gov.uk/environment/water/wfd/economics/pdf/ceafreport.pdf>)

# Annex 1 – Background data

## Data sources

A number of data sources have been used in compiling this document.

Economic forecasts have been produced by Experian Business Services Limited, based on output and employment information from the Office of National Statistics.

Various economic information sources were reviewed and summarised in the 2004 report *Economic Importance and Dynamics of Water Use Relevant for River Basin Characterisation (England and Wales)* (ref 1). Data sources were identified in Annex G – Data Audit File of this report. In addition, profiles of economic sectors and trends in their water use were compiled and included at Annex E of the report. These data sources have been used for compilation of this *Article 5 Supporting Document*.

Stakeholder templates were completed by a number of industry groups and these have also assisted in the compilation of this document. These are found in Annex I of the above mentioned report. Profiles were provided by the following groups:

- Electricity Industry Joint Environment Programme (Powergen, RWE, Innogy, AEP, Drax Power Ltd, British Energy, EDF Energy, International Power, Scottish Power);
- British Ports Association and United Kingdom Major Ports Group;
- WaterVoice;
- British Hydropower Association;
- Royal Society for the Protection of Birds (RSPB); and
- British Waterways.

Information on abstractions and discharges has been sourced from the Environment Agency.

Information on water companies has been provided by Ofwat and draws on work completed for the *Cost Recovery and Incentive Pricing* report (ref 3).

## **Geographical areas**

Throughout this document several terms are used to describe geographical areas. To aid comprehension these are briefly defined:

### **River Basin District**

Individual river basins have been identified and assigned to River Basin Districts, referred to within the document as RBDs. There are 11 RBDs within England and Wales, this document concentrates on the Severn RBD.

### **Government Office Regions**

England has been subdivided into 9 Government Office Regions. These are the primary statistical subdivisions of England and contain a number of local authorities.

### **Unitary Authorities**

These are the primary of two tiers within Welsh local Government. Unitary authorities are the principal authorities and were formed from the merger of the two previous local Government tiers: county councils and borough councils.

### **Community and Town Councils**

There are 737 community and town councils and these form the second tier in Welsh local Government. Prior to the Local Government Act 1972, community councils were known as parish councils. However, there is incomplete coverage by community and town councils: there are 115 officially-defined 'communities' for which no council exists.

### **County**

There are 34 non-metropolitan counties in England and they form the upper tier of the two-tier local Government structure found in many parts of England.

### **Local Authority District**

Local Authority Districts form the lower tier of the two-tier local Government structure.

### **Electoral Wards**

Electoral wards are the spatial units used to elect local Government councillors in the UK. For the Article 5 supporting documents key information for each of the RBDs, for example population and employment numbers have been built up from ward level data.

## **Super Output Areas**

Super Output Areas (SOAs) are a new geography designed to improve the reporting of small area statistics. Due to the stability and consistency limitations of the electoral ward geography, a range of areas that are of consistent size and whose boundaries will not change was put forward. These have been built from groups of 2001 Census Output Areas (OAs) and are known as Super Output Areas (SOAs). Three layers of SOA were created.

## **Annex 2 – Experian forecasts**

The following table summarises the population, household, employment and output forecasts undertaken by Experian Business Strategies Limited for the Severn RBD. Employment and output forecasts have been undertaken for 30 SICs as well as a number of disaggregated categories that have some link to water status.

Actual and forecast output is measured in constant price terms (based on 2002 prices). Prices are assumed to remain constant within the forecasts, so that forecast changes in output are net of price movements. Output is defined as a value added measure of production (i.e. net of input costs).

Experian's industry forecasts for RBDs in the UK are summations of ward level forecasts. These forecasts are informed by two key sources of information. The first is historic estimates of employment by industry at the ward level between 1995 and 2002. The second is Experian forecasts for employment and output for industry categories for local/unitary authority districts. The first step is to forecast ward level employment for each industry by using the past relationship in employment in the ward compared to its wider district. The second step is to estimate output in each industry for each ward by applying district level productivity trends to the employment forecast. These ward level forecasts are then aggregated to the relevant RBD boundaries.

For employment and output, data are presented for 30 SIC codes, as well as for a number of disaggregated SIC codes. These disaggregated categories were chosen on the basis of the impacts and pressures analysis and as being the most relevant in terms of the risk assessment.

POPULATION AND HOUSEHOLDS	1995	2002	2015	Share of economy			Annual Average Growth	
				1995	2002	2015	1995-2002	2002-2015
	(000s)	(000s)	(000s)	(%)	(%)	(%)	(%)	(%)
<b>Total population</b>	5,183	5,318	5,589				0.4	0.4
<b>Total households</b>	2,079	2,221	2,476				0.9	0.8

EMPLOYEES IN EMPLOYMENT	1995	2002	2015	Share of economy			Annual Average Growth	
				1995	2002	2015	1995-2002	2002-2015
Standard 30 categories	(000s)	(000s)	(000s)	(%)	(%)	(%)	(%)	(%)
Agriculture, forestry & fishing	30.4	25.5	19.9	1.5	1.1	0.8	-2.4	-1.9
Oil & gas extraction	0.1	0.3	0.1	0.0	0.0	0.0	13.1	-6.6
Other mining	3.1	3.9	2.9	0.1	0.2	0.1	3.1	-2.2
Gas, electricity & water	18.7	13.0	8.9	0.9	0.6	0.4	-5.1	-2.9
Fuel refining	0.5	0.8	0.6	0.0	0.0	0.0	6.6	-2.4
Chemicals	14.6	11.2	9.0	0.7	0.5	0.4	-3.7	-1.7
Minerals	13.0	11.4	12.0	0.6	0.5	0.5	-1.8	0.4
Metals	90.7	66.3	55.0	4.3	2.9	2.2	-4.4	-1.4
Machinery & equipment	51.2	45.6	32.8	2.5	2.0	1.3	-1.6	-2.5
Electrical & optical equipment	55.9	48.6	45.8	2.7	2.1	1.9	-2.0	-0.5
Transport equipment	50.3	54.2	41.6	2.4	2.3	1.7	1.1	-2.0
Food, drink & tobacco	44.5	41.9	36.4	2.1	1.8	1.5	-0.9	-1.1
Textiles & clothing	21.7	12.6	8.7	1.0	0.5	0.4	-7.4	-2.8
Wood & wood products	8.8	9.1	9.4	0.4	0.4	0.4	0.5	0.2
Paper, printing & publishing	41.8	34.8	30.8	2.0	1.5	1.3	-2.6	-0.9
Rubber & plastics	31.8	29.1	22.6	1.5	1.3	0.9	-1.2	-1.9
Other manufacturing	24.0	26.3	28.6	1.1	1.1	1.2	1.3	0.6
Construction	76.4	107.2	95.5	3.7	4.6	3.9	4.9	-0.9
Retailing	212.3	253.8	268.3	10.2	10.9	10.9	2.6	0.4
Wholesale & distribution	151.1	155.4	152.9	7.2	6.7	6.2	0.4	-0.1
Hotels & catering	121.3	152.7	175.8	5.8	6.6	7.1	3.3	1.1
Transport	53.7	67.8	70.0	2.6	2.9	2.8	3.4	0.2
Communications	37.4	48.7	57.4	1.8	2.1	2.3	3.8	1.3
Banking & insurance	85.1	80.4	84.6	4.1	3.5	3.4	-0.8	0.4
Business services	219.6	261.4	304.4	10.5	11.3	12.4	2.5	1.2
Other financial & business services	30.8	46.4	49.0	1.5	2.0	2.0	6.0	0.4
Public administration & defence	127.0	135.8	125.2	6.1	5.8	5.1	1.0	-0.6
Education	166.8	215.4	213.4	8.0	9.3	8.7	3.7	-0.1
Health	220.4	255.0	328.8	10.5	11.0	13.4	2.1	2.0
Other services	86.1	108.2	170.8	4.1	4.7	6.9	3.3	3.6
<b>Total employees</b>	<b>2089.2</b>	<b>2323.0</b>	<b>2461.3</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>1.5</b>	<b>0.4</b>

EMPLOYEES IN EMPLOYMENT- DISAGGREGATED CATEGORIES	1995  (000s)	2002  (000s)	2015  (000s)	Share of economy			Annual Average Growth	
				1995	2002	2015	1995- 2002	2002- 2015
				(%)	(%)	(%)	(%)	(%)
Electricity, gas, steam & hot water supply (SIC40)	14.2	10.0	6.7	0.7	0.4	0.3	-4.9	-3.1
Production & distribution of electricity (SIC40.1)	10.1	6.4	4.3	0.5	0.3	0.2	-6.3	-3.0
Manufacture of gas (SIC40.2)	3.8	3.4	2.2	0.2	0.1	0.1	-1.7	-3.2
Steam & hot water supply (SIC40.3)	0.3	0.2	0.1	0.0	0.0	0.0	-6.6	-3.8
Collection, purification & distribution of water (SIC41)	4.5	3.0	2.2	0.2	0.1	0.1	-5.6	-2.2
Manufacture of basic chemicals (SIC24.1)	5.2	3.7	2.8	0.3	0.2	0.1	-4.6	-2.2
Manufacture of pesticides & other agro-chemicals (SIC24.2)	0.2	0.2	0.2	0.0	0.0	0.0	1.6	-2.0
Manufacture of paints & varnishes etc. (SIC24.3)	2.8	1.2	0.9	0.1	0.1	0.0	-11.5	-2.3
Manufacture of pharmaceuticals (SIC24.4)	2.6	2.7	2.3	0.1	0.1	0.1	0.7	-1.2
Manufacture of soaps & detergents (SIC24.5)	1.6	1.4	1.1	0.1	0.1	0.0	-1.7	-1.4
Manufacture of other chemical products (SIC24.6)	2.0	1.9	1.7	0.1	0.1	0.1	-0.8	-0.9
Manufacture of man made fibres (SIC24.7)	0.3	0.1	0.0	0.0	0.0	0.0	-15.1	-15.0
Manufacture of basic metals (SIC27)	23.2	16.3	14.0	1.1	0.7	0.6	-4.9	-1.2
Manufacture of pulp, paper & paper products (SIC21)	8.7	7.0	6.3	0.4	0.3	0.3	-3.0	-0.9
Mining of coal & lignite (SIC10)	0.4	0.7	0.4	0.0	0.0	0.0	9.1	-4.4
Mining of uranium & thorium (SIC12)	0.0	0.0	0.0	0.0	0.0	0.0	#DIV/0!	#DIV/0!
Mining of metal ores (SIC13)	0.0	0.0	0.0	0.0	0.0	0.0	-19.0	-4.5
Other mining (SIC14)	2.8	3.2	2.5	0.1	0.1	0.1	2.3	-1.9
Sewage & refuse disposal (SIC90)	4.9	6.9	10.7	0.2	0.3	0.4	4.8	3.4
Agriculture, hunting & related activities (SIC01)	21.0	18.4	14.5	1.0	0.8	0.6	-1.9	-1.8
Growing of crops (SIC011)	6.6	6.4	5.3	0.3	0.3	0.2	-0.5	-1.5
Growing of cereals (SIC0111)	1.4	1.3	1.1	0.1	0.1	0.0	-0.6	-1.4
Growing of vegetables (SIC0112)	4.4	4.1	3.3	0.2	0.2	0.1	-0.9	-1.8
Growing of fruits, nuts & spices (SIC0113)	0.9	0.9	0.9	0.0	0.0	0.0	1.4	-0.6
Farming of animals (SIC012)	5.3	4.4	3.2	0.3	0.2	0.1	-2.7	-2.3
Farming of cattle (SIC0121)	2.5	2.0	1.5	0.1	0.1	0.1	-3.0	-2.3
Farming of sheep, goats etc. (SIC0122)	0.4	0.3	0.2	0.0	0.0	0.0	-3.5	-2.0
Farming of swine (SIC0123)	0.2	0.1	0.1	0.0	0.0	0.0	-3.7	-1.9
Farming of poultry (SIC0124)	1.8	1.6	1.2	0.1	0.1	0.0	-1.4	-2.5

EMPLOYEES IN EMPLOYMENT- DISAGGREGATED CATEGORIES	1995	2002	2015	Share of economy			Annual Average Growth	
				1995	2002	2015	1995- 2002	2002- 2015
				(000s)	(000s)	(000s)	(%)	(%)
Other farming of animals (SIC0125)	0.5	0.4	0.3	0.0	0.0	0.0	-4.7	-1.7
Growing of crops combined with farming of animals (SIC013)	0.9	0.9	0.7	0.0	0.0	0.0	-0.5	-1.7
Agricultural & animal husbandry service activities, except veterinary (SIC014)	8.1	6.6	5.3	0.4	0.3	0.2	-2.9	-1.7
Hunting, gaming & game propagation (SIC015)	0.1	0.1	0.1	0.0	0.0	0.0	0.4	-1.6
Forestry, logging & related activities (SIC02)	9.3	7.2	5.3	0.4	0.3	0.2	-3.7	-2.3
Fishing (SIC05)	0.0	0.0	0.0	0.0	0.0	0.0	-5.2	-0.6
Fishing (SIC0501)	0.0	0.0	0.0	0.0	0.0	0.0	-7.0	-0.2
Operation of fish hatcheries & fish farms (SIC0502)	0.0	0.0	0.0	0.0	0.0	0.0	-1.2	-1.4
Production, processing and preserving of meat (SIC151)	11.7	11.4	10.5	0.6	0.5	0.4	-0.4	-0.6
Processing and preserving of fish (SIC152)	0.4	0.5	0.4	0.0	0.0	0.0	2.9	-1.5
Manufacture of dairy products (SIC155)	3.5	3.7	3.5	0.2	0.2	0.1	1.1	-0.6
Manufacture of beverage products (SIC159)	5.7	4.7	4.0	0.3	0.2	0.2	-2.7	-1.2
Production of mineral waters and soft drinks (SIC1598)	1.4	1.1	1.0	0.1	0.0	0.0	-3.4	-0.8
Manufacture of rubber products (SIC251)	6.1	5.5	4.4	0.3	0.2	0.2	-1.4	-1.8
Manufacture of cement, lime and plaster (SIC265)	0.3	0.4	0.4	0.0	0.0	0.0	6.8	0.3
Manufacture of articles of concrete, plaster and cement (SIC266)	3.7	3.6	4.1	0.2	0.2	0.2	-0.2	0.9
Manufacture of basic iron and steel and ferro-alloys (SIC271)	7.1	4.8	4.6	0.3	0.2	0.2	-5.5	-0.3
Manufacture of basic precious and non-ferrous metals (SIC274)	6.0	4.4	3.8	0.3	0.2	0.2	-4.2	-1.3
Manufacture of parts and accessories for motor vehicles and engines (SIC343)	23.1	23.2	17.9	1.1	1.0	0.7	0.1	-2.0
Manufacture of aircraft and spacecraft (SIC353)	12.8	15.4	11.8	0.6	0.7	0.5	2.7	-2.1
Camping sites and other provision of short-stay accommodation (SIC552)	1.8	2.2	2.5	0.1	0.1	0.1	2.9	0.9
Sporting activities (SIC926)	17.5	22.4	35.2	0.8	1.0	1.4	3.6	3.5
Manufacture of industrial gases (SIC2411)	0.1	0.1	0.0	0.0	0.0	0.0	-4.0	-5.5
Manufacture of dyes and pigments (SIC2412)	0.2	0.1	0.0	0.0	0.0	0.0	-14.0	-5.6
Manufacture of other inorganic basic chemicals (SIC2413)	0.7	0.5	0.3	0.0	0.0	0.0	-4.0	-3.8

EMPLOYEES IN EMPLOYMENT- DISAGGREGATED CATEGORIES	1995  (000s)	2002  (000s)	2015  (000s)	Share of economy			Annual Average Growth	
				1995	2002	2015	1995- 2002	2002- 2015
				(%)	(%)	(%)	(%)	(%)
Manufacture of other organic basic chemicals (SIC2414)	1.0	0.6	0.3	0.0	0.0	0.0	-8.2	-3.7
Manufacture of fertilizers and nitrogen compounds (SIC2415)	0.3	0.2	0.1	0.0	0.0	0.0	-6.3	-1.1
Manufacture of plastics in primary forms (SIC2416)	2.9	2.3	1.9	0.1	0.1	0.1	-3.5	-1.6
Manufacture of synthetic rubber in primary forms (SIC2417)	0.1	0.1	0.1	0.0	0.0	0.0	1.3	-2.7
Casting of light metals (SIC2753)	2.0	1.5	1.4	0.1	0.1	0.1		
Casting of other non-ferrous metals (SIC2754)	1.4	1.1	0.9	0.1	0.0	0.0	-3.3	-1.7
Sea and coastal water transport (SIC6110)	0.2	0.3	0.3	0.0	0.0	0.0	4.5	1.0
Inland water transport (SIC6120)	0.1	0.1	0.1	0.0	0.0	0.0	0.9	0.0
Washing and dry cleaning of textile and fur products (SIC9301)	2.8	3.6	5.8	0.1	0.2	0.2	3.5	3.9
Construction of water projects (SIC4524)	0.4	0.3	0.3	0.0	0.0	0.0	-4.2	-0.4

OUTPUT (£million, 2000 prices)	1995	2002	2015	Share of economy			Annual Average Growth	
				1995	2002	2015	1995-2002	2002-2015
Standard 30 categories	(£m)	(£m)	(£m)	(%)	(%)	(%)	(%)	(%)
Agriculture, forestry & fishing	968.7	1131.3	1125.8	1.7	1.6	1.1	2.2	0.0
Oil & gas extraction	7.2	13.1	8.8	0.0	0.0	0.0	8.8	-3.0
Other mining	275.6	269.6	252.0	0.5	0.4	0.3	-0.3	-0.5
Gas, electricity & water	1515.8	1730.1	2111.4	2.6	2.5	2.1	1.9	1.5
Fuel refining	42.5	70.6	49.7	0.1	0.1	0.1	7.5	-2.7
Chemicals	690.7	749.5	1000.4	1.2	1.1	1.0	1.2	2.2
Minerals	380.7	409.3	546.2	0.6	0.6	0.6	1.0	2.2
Metals	2438.8	2135.9	1944.6	4.2	3.0	2.0	-1.9	-0.7
Machinery & equipment	1800.0	1666.1	1630.0	3.1	2.4	1.6	-1.1	-0.2
Electrical & optical equipment	1602.7	1892.4	3531.2	2.7	2.7	3.6	2.4	4.9
Transport equipment	1737.7	2306.8	2976.2	3.0	3.3	3.0	4.1	2.0
Food, drink & tobacco	1833.2	1728.3	1950.6	3.1	2.5	2.0	-0.8	0.9
Textiles & clothing	473.0	337.7	313.5	0.8	0.5	0.3	-4.7	-0.6
Wood & wood products	246.1	254.4	329.3	0.4	0.4	0.3	0.5	2.0
Paper, printing & publishing	1731.2	1564.5	1657.0	3.0	2.2	1.7	-1.4	0.4
Rubber & plastics	1062.7	957.6	1125.8	1.8	1.4	1.1	-1.5	1.3
Other manufacturing	839.6	944.7	1253.0	1.4	1.3	1.3	1.7	2.2
Construction	3668.0	4553.3	6182.7	6.3	6.5	6.2	3.1	2.4
Retailing	2899.4	4317.6	6178.3	4.9	6.2	6.2	5.9	2.8
Wholesale & distribution	4447.1	5409.4	7538.6	7.6	7.7	7.6	2.8	2.6
Hotels & catering	1829.9	2362.2	3200.6	3.1	3.4	3.2	3.7	2.4
Transport	1985.7	2693.8	3493.3	3.4	3.8	3.5	4.5	2.0
Communications	1208.3	2484.6	5905.5	2.1	3.5	6.0	10.8	6.9
Banking & insurance	2864.5	3177.1	5299.1	4.9	4.5	5.3	1.5	4.0
Business services	5404.7	7123.2	13292.5	9.2	10.2	13.4	4.0	4.9
Other financial & business services	1624.6	2197.5	3263.7	2.8	3.1	3.3	4.4	3.1
Public administration & defence	4691.0	5093.9	5061.0	8.0	7.3	5.1	1.2	0.0
Education	4006.4	4630.7	5054.5	6.8	6.6	5.1	2.1	0.7
Health	3860.7	4788.5	7406.3	6.6	6.8	7.5	3.1	3.4
Other services	2525.4	3140.2	5494.9	4.3	4.5	5.5	3.2	4.4
<b>Total Output</b>	<b>58662.1</b>	<b>70134.0</b>	<b>99176.5</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>2.6</b>	<b>2.7</b>

OUTPUT- DISAGGREGATED CATEGORIES (£million, 2000 prices)	1995	2002	2015	Share of economy			Annual Average Growth	
				1995	2002	2015	1995- 2002	2002- 2015
				(£m)	(£m)	(£m)	(%)	(%)
Electricity, gas, steam & hot water supply (SIC40)	1178.7	1362.0	1614.8	2.0	1.9	1.6	2.1	1.3
Production & distribution of electricity (SIC40.1)	846.0	831.5	1030.0	1.4	1.2	1.0	-0.2	1.7
Manufacture of gas (SIC40.2)	310.1	509.1	560.5	0.5	0.7	0.6	7.3	0.7
Steam & hot water supply (SIC40.3)	22.5	21.5	24.4	0.0	0.0	0.0	-0.7	1.0
Collection, purification & distribution of water (SIC41)	337.1	368.1	496.5	0.6	0.5	0.5	1.3	2.3
Manufacture of basic chemicals (SIC24.1)	239.8	240.7	296.1	0.4	0.3	0.3	0.1	1.6
Manufacture of pesticides & other agro-chemicals (SIC24.2)	10.3	18.0	23.8	0.0	0.0	0.0	8.3	2.2
Manufacture of paints & varnishes etc. (SIC24.3)	131.5	79.3	97.4	0.2	0.1	0.1	-7.0	1.6
Manufacture of pharmaceuticals (SIC24.4)	138.5	197.5	281.5	0.2	0.3	0.3	5.2	2.8
Manufacture of soaps & detergents (SIC24.5)	70.3	93.9	130.1	0.1	0.1	0.1	4.2	2.5
Manufacture of other chemical products (SIC24.6)	82.5	114.0	170.3	0.1	0.2	0.2	4.7	3.1
Manufacture of man made fibres (SIC24.7)	17.8	6.1	1.2	0.0	0.0	0.0	-14.2	-11.9
Manufacture of basic metals (SIC27)	688.3	552.4	496.6	1.2	0.8	0.5	-3.1	-0.8
Manufacture of pulp, paper & paper products (SIC21)	367.5	328.0	345.5	0.6	0.5	0.3	-1.6	0.4
Mining of coal & lignite (SIC10)	45.9	49.7	28.2	0.1	0.1	0.0	1.1	-4.3
Mining of uranium & thorium (SIC12)	0.0	0.0	0.0	0.0	0.0	0.0		
Mining of metal ores (SIC13)	1.7	0.3	0.2	0.0	0.0	0.0	-21.7	-2.4
Other mining (SIC14)	228.0	219.6	223.6	0.4	0.3	0.2	-0.5	0.1
Sewage & refuse disposal (SIC90)	181.3	247.0	418.8	0.3	0.4	0.4	4.5	4.1
Agriculture, hunting & related activities (SIC01)	679.7	827.7	851.4	1.2	1.2	0.9	2.9	0.2
Growing of crops (SIC011)	206.9	297.5	295.6	0.4	0.4	0.3	5.3	0.0
Growing of cereals (SIC0111)	43.4	63.6	62.5	0.1	0.1	0.1	5.6	-0.1
Growing of vegetables (SIC0112)	139.6	189.1	184.1	0.2	0.3	0.2	4.4	-0.2
Growing of fruits, nuts & spices (SIC0113)	23.9	44.8	49.0	0.0	0.1	0.0	9.4	0.7
Farming of animals (SIC012)	161.8	182.8	164.3	0.3	0.3	0.2	1.8	-0.8
Farming of cattle (SIC0121)	74.4	88.1	76.5	0.1	0.1	0.1	2.4	-1.1
Farming of sheep, goats etc. (SIC0122)	13.5	15.0	15.3	0.0	0.0	0.0	1.6	0.1
Farming of swine (SIC0123)	6.0	6.3	7.8	0.0	0.0	0.0	0.8	1.7
Farming of poultry (SIC0124)	50.7	59.9	52.1	0.1	0.1	0.1	2.4	-1.1

OUTPUT- DISAGGREGATED CATEGORIES (£million, 2000 prices)	1995	2002	2015	Share of economy			Annual Average Growth	
				1995	2002	2015	1995- 2002	2002- 2015
				(£m)	(£m)	(£m)	(%)	(%)
Other farming of animals (SIC0125)	17.2	13.5	12.6	0.0	0.0	0.0	-3.4	-0.6
Growing of crops combined with farming of animals (SIC013)	29.3	42.4	42.3	0.0	0.1	0.0	5.4	0.0
Agricultural & animal husbandry service activities, except veterinary (SIC014)	278.9	301.4	345.3	0.5	0.4	0.3	1.1	1.1
Hunting, gaming & game propagation (SIC015)	2.8	3.6	3.9	0.0	0.0	0.0	3.8	0.6
Forestry, logging & related activities (SIC02)	287.9	302.4	272.6	0.5	0.4	0.3	0.7	-0.8
Fishing (SIC05)	1.2	1.2	1.8	0.0	0.0	0.0	0.1	3.3
Fishing (SIC0501)	0.9	0.7	1.4	0.0	0.0	0.0	-4.2	5.5
Operation of fish hatcheries & fish farms (SIC0502)	0.3	0.5	0.4	0.0	0.0	0.0	9.9	-1.2
Production, processing and preserving of meat (SIC151)	475.5	470.1	567.9	0.8	0.7	0.6	-0.2	1.5
Processing and preserving of fish (SIC152)	13.7	17.7	19.1	0.0	0.0	0.0	3.7	0.6
Manufacture of dairy products (SIC155)	147.4	164.5	198.9	0.3	0.2	0.2	1.6	1.5
Manufacture of beverage products (SIC159)	242.6	200.8	225.2	0.4	0.3	0.2	-2.7	0.9
Production of mineral waters and soft drinks (SIC1598)	62.7	49.0	56.8	0.1	0.1	0.1	-3.5	1.1
Manufacture of rubber products (SIC251)	206.2	188.4	225.8	0.4	0.3	0.2	-1.3	1.4
Manufacture of cement, lime and plaster (SIC265)	8.5	15.3	20.4	0.0	0.0	0.0	8.7	2.2
Manufacture of articles of concrete, plaster and cement (SIC266)	115.3	143.6	207.7	0.2	0.2	0.2	3.2	2.9
Manufacture of basic iron and steel and ferro-alloys (SIC271)	255.4	179.1	164.1	0.4	0.3	0.2	-4.9	-0.7
Manufacture of basic precious and non-ferrous metals (SIC274)	159.2	145.0	136.0	0.3	0.2	0.1	-1.3	-0.5
Manufacture of parts and accessories for motor vehicles and engines (SIC343)	773.0	924.8	1194.8	1.3	1.3	1.2	2.6	2.0
Manufacture of aircraft and spacecraft (SIC353)	464.9	743.4	942.5	0.8	1.1	1.0	6.9	1.8
Camping sites and other provision of short-stay accommodation (SIC552)	27.4	33.8	44.6	0.0	0.0	0.0	3.1	2.2
Sporting activities (SIC926)	497.9	626.3	1077.4	0.8	0.9	1.1	3.3	4.3
Manufacture of industrial gases (SIC2411)	5.1	4.6	3.5	0.0	0.0	0.0	-1.4	-2.2
Manufacture of dyes and pigments (SIC2412)	9.0	3.8	3.0	0.0	0.0	0.0	-11.5	-1.9
Manufacture of other inorganic basic chemicals (SIC2413)	33.9	33.6	32.7	0.1	0.0	0.0	-0.1	-0.2

OUTPUT- DISAGGREGATED CATEGORIES (£million, 2000 prices)	1995	2002	2015	Share of economy			Annual Average Growth	
				1995	2002	2015	1995- 2002	2002- 2015
				(£m)	(£m)	(£m)	(%)	(%)
Manufacture of other organic basic chemicals (SIC2414)	58.1	39.5	39.6	0.1	0.1	0.0	-5.4	0.0
Manufacture of fertilizers and nitrogen compounds (SIC2415)	9.8	12.7	19.1	0.0	0.0	0.0	3.7	3.2
Manufacture of plastics in primary forms (SIC2416)	119.0	140.2	191.5	0.2	0.2	0.2	2.4	2.4
Manufacture of synthetic rubber in primary forms (SIC2417)	4.9	6.2	6.7	0.0	0.0	0.0	3.4	0.6
Casting of light metals (SIC2753)	53.8	49.1	46.6	0.1	0.1	0.0	-1.3	-0.4
Casting of other non-ferrous metals (SIC2754)	34.3	34.2	30.9	0.1	0.0	0.0	-0.1	-0.8
Sea and coastal water transport (SIC6110)	7.7	11.1	15.2	0.0	0.0	0.0	5.3	2.5
Inland water transport (SIC6120)	1.8	2.1	2.8	0.0	0.0	0.0	2.4	2.1
Washing and dry cleaning of textile and fur products (SIC9301)	88.9	109.5	199.7	0.2	0.2	0.2	3.0	4.7
Construction of water projects (SIC4524)	18.0	13.3	20.8	0.0	0.0	0.0	-4.3	3.5