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## Northumbria RBD

Article 5 economic analysis of water use supporting document

Water Framework Directive  
Article 5

Economic Analysis of Water Use

Supporting Document  
Northumbria River Basin District

March 2005

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# 1 Introduction

## 1.1 Article 5 reporting requirements

This report is a supporting document to the Article 5 report for the Northumbria River Basin District (RBD). It provides contextual economic and cost recovery information that provides background to the Article 5 report on the Northumbria 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 Northumbria 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, Cost Recovery and Incentive Pricing* and *Cost-Effectiveness Analysis and Developing a Methodology to Assess Disproportionate Costs*.

<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 Northumbria 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 the associated risk assessment;
- **Water services and cost recovery:** This section presents information received from the Office of Water Services (Ofwat) on public water supply and sewerage services within the Northumbria RBD in terms of financial cost of water services. Details are also provided on the level of environmental expenditure by the companies within 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* (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 geographic areas are used this is clearly noted.

## 2 Driving forces

This section provides an overview of the socio-economic characteristics of the Northumbria economy and includes the following information:

- **General profile:** Presents an introduction to the Northumbria RBD in terms of location, major urban centres and distinguishing characteristics;
- **Population and households:** Presents an outline of the historical change in the Northumbria 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 Northumbria 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 Northumbria RBD;
- **Other socio-economic characteristics:** Presents information for the Northumbria RBD specifically relating to the level of deprivation, the level of the working age population claiming Job Seeker Allowances (available to those unemployed persons who are both available for and actively seeking work) and the level of working age population with no qualifications. This information helps to build an understanding of the potential need for Government intervention; and
- **Area based initiatives:** Present area based initiatives specific to the Northumbria RBD arising from Government area based policies. Many of these initiatives are focused on regenerating 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 Northumbria RBD is located in the far North East of England and covers an area of approximately 9,029 km<sup>2</sup>. The RBD contains the following principal urban settlements<sup>1</sup>:

- Darlington (population 97,838);
- Stockton on Tees (population 178,408);
- Middlesbrough (population 134,855);
- Sunderland (population 280,807);
- Newcastle (population 259,536);
- Gateshead (population 191,151); and
- Hartlepool (population 88,611).

The RBD contains the Port of Tees and Hartlepool and the Port of Tyne. The Port of Tyne handles forest products, steel and metals, cars and bulk products. Passenger ferries also use the port to transport people to Scandinavia and the Baltics. The port is a significant source of employment for the RBD.

The RBD has a significant industrial heritage with a number of previous coalfield communities. Newcastle was heavily involved in the coal, iron and steel industries and was once one of the most important shipbuilding centres in the country. Newcastle was also strongly linked with the railway industry.

Towards the west of the RBD there is a considerable rural element with mountains and moor land dominating the landscape.

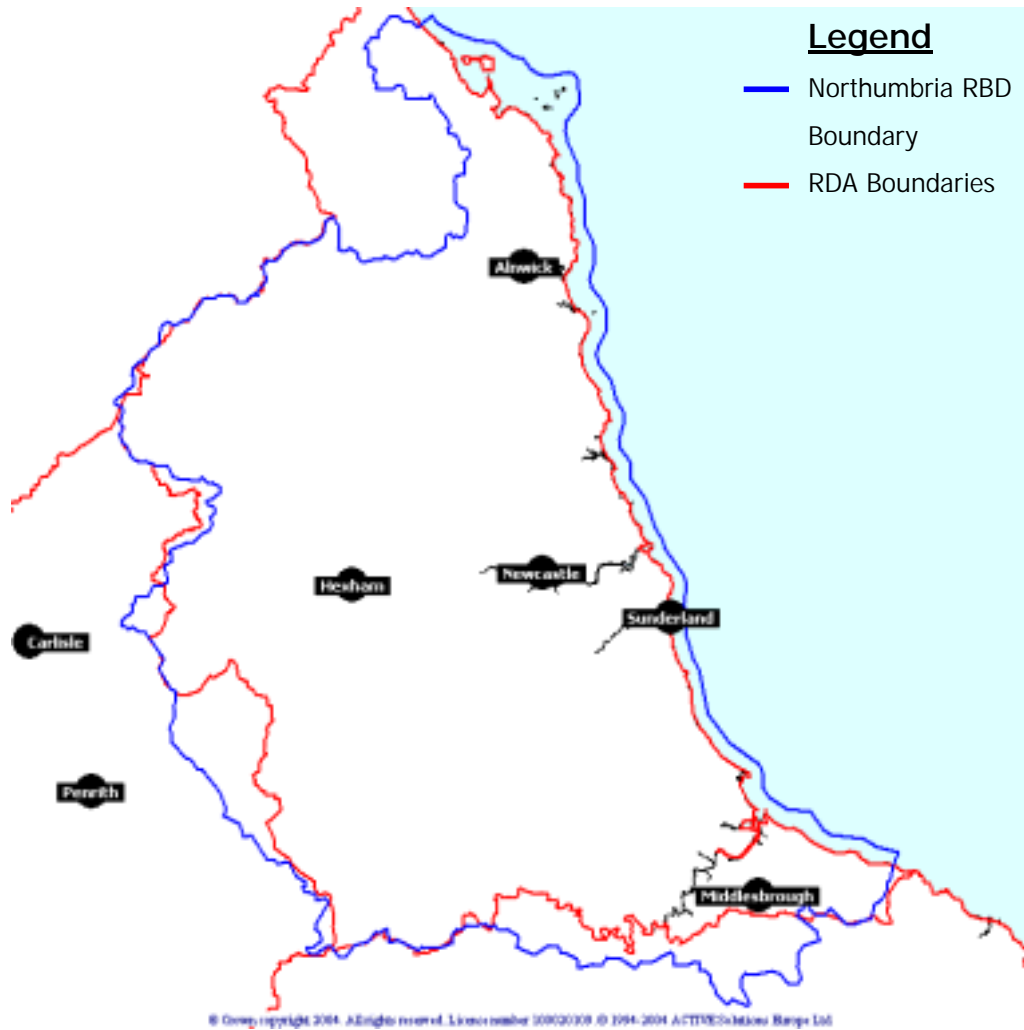
Figure 2.1 shows the boundary of the Northumbria RBD and indicates the principal urban settlements. Regional Development Agency (RDA) boundaries have been included.

Regional Development Agencies (RDAs) are non-departmental public bodies. There are nine RDAs in the English 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 RDAs covering the Northumbria RBD are One North East, the North West Development Agency and Yorkshire Forward.

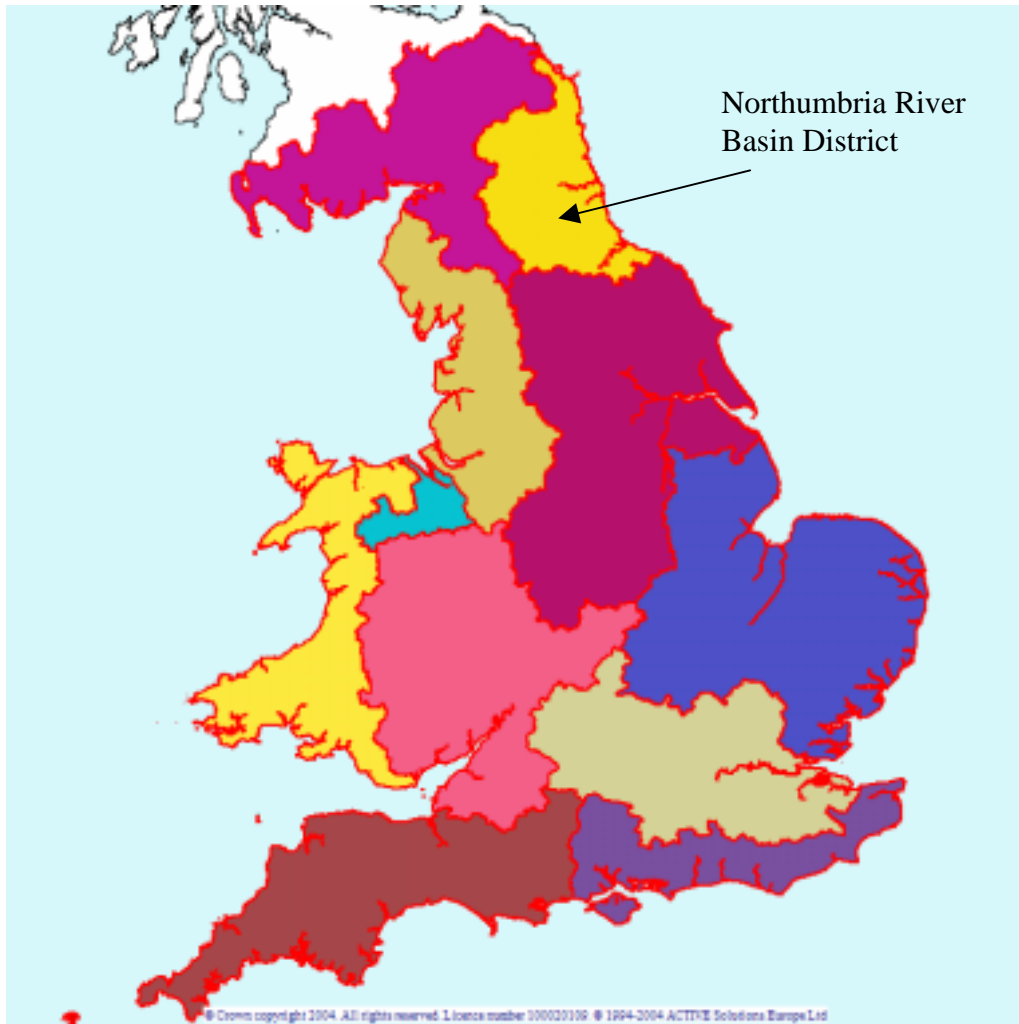
<sup>1</sup> Census, 2001.

**Figure 2.1: Northumbria RDB and RDA boundaries**



For additional context, the location of the Northumbria RDB within England and Wales is illustrated in Figure 2.2.

**Figure 2.2: Northumbria RBD location map**



## 2.2 Population and households

Table 2.1 indicates the Northumbria RBD population in 1995 and 2002 based on NOMIS<sup>1</sup> Ward 2002 datasets. The percentage changes in the Northumbria RBD are compared against the average percentage changes for all RBDs.

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

	1995 (000s)	2002 (000s)	Percentage change 1995-02	
<b>Population</b>				
Northumbria	2,573.6	2,514.2	Northumbria	-2.3
			All RBDs	2.1
<b>Households</b>				
Northumbria	1,045.6	1,074.1	Northumbria	2.7
			All RBDs	6.9
<b>Population per household</b>				
Northumbria	2.5	2.3	Northumbria	-4.9
			All RBDs	-4.5

Source: Experian Business Strategies Ltd

The Northumbria RBD population fell by 2.3 per cent between 1995 and 2002. This is in contrast to the average trend across all RBD's where population has risen by 2.1 per cent.

There were 1.05 million households in the Northumbria RBD in 1995 and 1.07 million households in 2002. The number of households in the Northumbria RBD increased by 2.7 per cent between 1995 and 2002. This compares with an increase of 6.9 per cent for all RBDs between 1995 and 2002.

The number of households within the RBD influences levels of water use. With no change in population, water per capita will generally increase if the number of households increases. The size of households in the Northumbria RBD has declined since 1995 at a greater rate than the average across all RBDs.

<sup>1</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 Northumbria RBD changes in output and employment are considered between 1995 and 2002. 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>1</sup>.

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

### 2.3.1 Output

Table 2.2 illustrates output for the Northumbria RBD by the 30 SIC codes. The summation of these 30 SIC categories provides a measure of the total output of the Northumbria RBD in value added terms. Total output was £26.1 billion in 2002.

Between 1995 and 2002 the economy of Northumbria grew by £1.8 billion, or 7.6 per cent. This equates to a growth rate of 1.1 per cent per annum, which is below the average rate for all RBDs of 2.9 per cent per year.

Further detail on the output in the most important water use related disaggregated SIC categories are provided in Annex 2.

<sup>1</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: Northumbria 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	Health	2559.6	9.8	6.7
2	Business services	2346.8	9.0	13.4
3	Education	1951.0	4.5	5.8
4	Construction	1766.6	6.8	6.0
5	Public administration & defence	1757.1	6.7	5.5
6	Retailing	1677.8	6.4	6.1
7	Wholesale & distribution	1499.6	5.7	7.5
8	Transport	1233.3	4.7	5.4
9	Other services	984.7	3.8	5.3
10	Chemicals	978.0	3.7	2.0
11	Hotels & catering	971.4	3.7	3.4
12	Communications	876.1	3.4	3.6
13	Food, drink & tobacco	834.7	3.2	2.4
14	Banking & insurance	823.6	3.2	5.9
15	Transport equipment	777.4	3.0	1.9
16	Metals	777.2	3.0	1.9
17	Gas, electricity & water	671.0	2.6	2.0
18	Other financial & business services	667.7	2.6	4.2
19	Electrical & optical equipment	541.5	2.1	1.9
20	Machinery & equipment	540.5	2.1	1.5
21	Paper, printing & publishing	394.2	1.5	2.6
22	Rubber & plastics	353.8	1.4	0.9
23	Agriculture, forestry & fishing	257.3	1.0	1.0
24	Other manufacturing	264.4	1.0	0.9
25	Wood & wood products	165.3	0.6	0.3
26	Other mining	163.4	0.6	0.3
27	Minerals	105.5	0.4	0.6
28	Textiles & clothing	97.0	0.4	0.6
29	Oil & gas extraction	78.4	0.3	0.1
30	Fuel refining	13.4	0.1	0.3
<b>Total Northumbria 2002 RBD Output</b>		<b>26128.3</b>		

Source: Experian Business Strategies Ltd

The Health sector contributes the highest proportion of output from the Northumbria RBD. Additionally, Business services, Education and Construction are all significant contributory sectors.

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

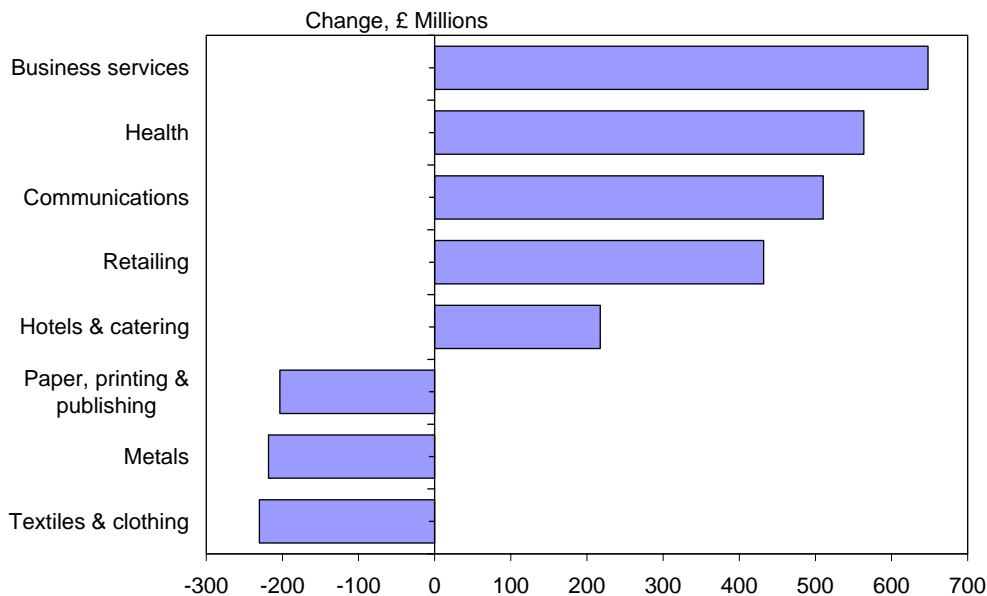
- Health;
- Public administration & defence; and
- Chemicals.

Figure 2.3 illustrates the sectors that have experienced the greatest changes in output between 1995 and 2002.

The greatest change in terms of value was in the Business services sector which grew by £650 million.

The Paper, printing & publishing industry, the Metals sector and Textiles & clothing have all contracted over this period. The largest decline in output was in the Textiles & clothing industry.

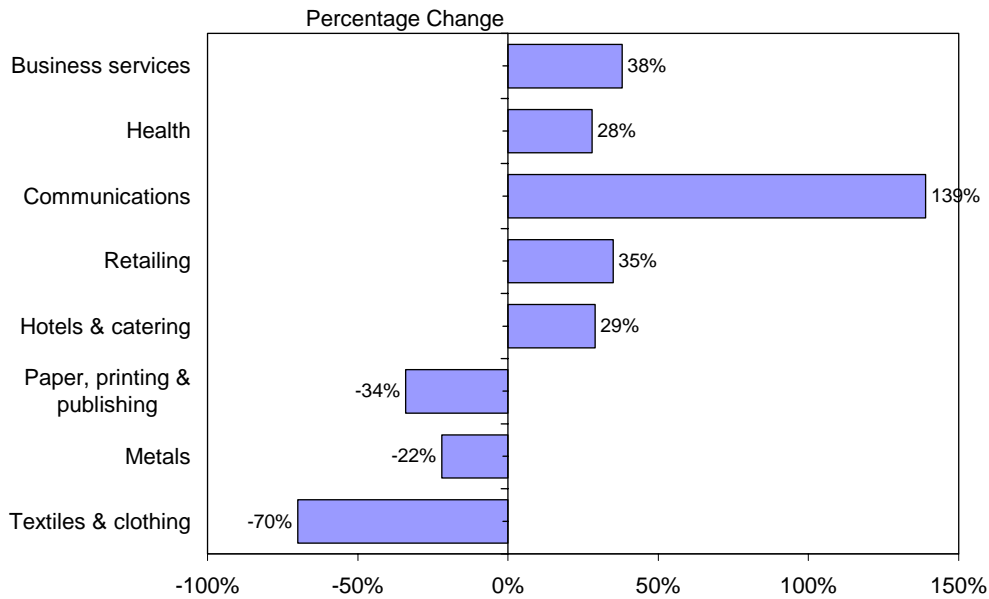
**Figure 2.3: Change in output, Northumbria RBD, 1995 to 2002**



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 38 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, with a growth rate of 139 per cent.

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



Source: Experian Business Strategies Ltd

### **2.3.2 Employment**

Health, retailing and business services are three of the most significant employment sectors for the Northumbria RBD. Northumbria has several retail and business centres, notably in Newcastle, Gateshead and Sunderland.

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

- Health;
- Public administration & defence; and
- Construction.

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

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

Rank	SIC category	Employment (000s)	Per cent of total employment	Per cent average call RBDs
1	Health	129.3	13.4	10.6
2	Retailing	101.7	10.6	10.9
3	Business services	91.4	9.5	13.3
4	Education	86.0	8.9	8.5
5	Public administration & defence	73.1	7.6	5.4
6	Hotels & catering	64.3	6.7	6.7
7	Construction	61.5	6.4	4.3
8	Other services	45.5	4.7	5.2
9	Wholesale & distribution	44.9	4.7	6.8
10	Transport	32.2	3.4	1.5
11	Metals	24.4	2.5	1.8
12	Banking & insurance	23.4	2.4	4.1
13	Machinery & equipment	20.2	2.1	1.3
14	Transport equipment	19.3	2.0	1.5
15	Communications	18.5	1.9	2.1
16	Food, drink & tobacco	17.5	1.8	1.8
17	Other financial & business services	15.6	1.6	2.6
18	Electrical & optical equipment	15.0	1.6	1.6
19	Chemicals	13.7	1.4	0.9
20	Rubber & plastics	13.2	1.4	0.9
21	Paper, printing & publishing	9.9	1.0	1.8
22	Other manufacturing	9.9	1.0	0.8
23	Agriculture, forestry & fishing	8.4	0.9	0.9
24	Textiles & clothing	5.8	0.6	0.8
25	Gas, electricity & water	5.2	0.5	0.5
26	Wood & wood products	4.4	0.5	0.3
27	Minerals	3.4	0.4	0.5
28	Other mining	2.2	0.2	0.2
29	Oil & gas extraction	1.3	0.1	0.1
30	Fuel refining	0.1	0.0	0.1
Total Employment Northumbria RBD		961.3	100	100

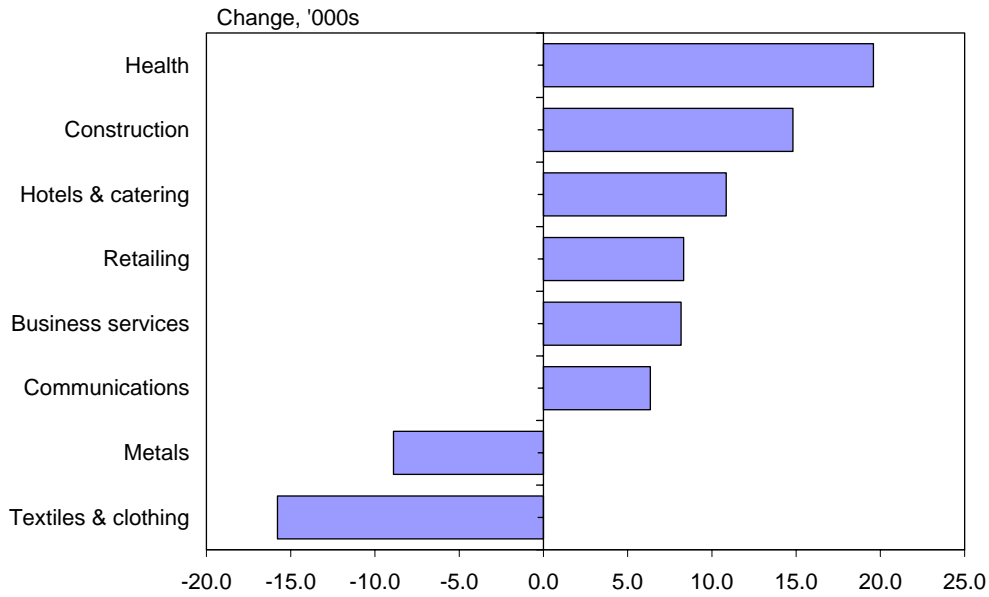
Source: Experian Business Strategies Ltd

The most significant changes in employment by industry are illustrated in Figure 2.5 below. Between 1995 and 2002 employment in Northumbria has increased by 37,800 or 4.1 per cent.

There was an increased importance in employment in the Health, Construction and Hotels & catering sectors. The largest growth in employees was in the Health sector which increased employment by 19,600.

Employment in the manufacturing industries of both Metals and Textiles & clothing declined between 1995 and 2002. The Textiles & clothing sector reduced employment by 15,800.

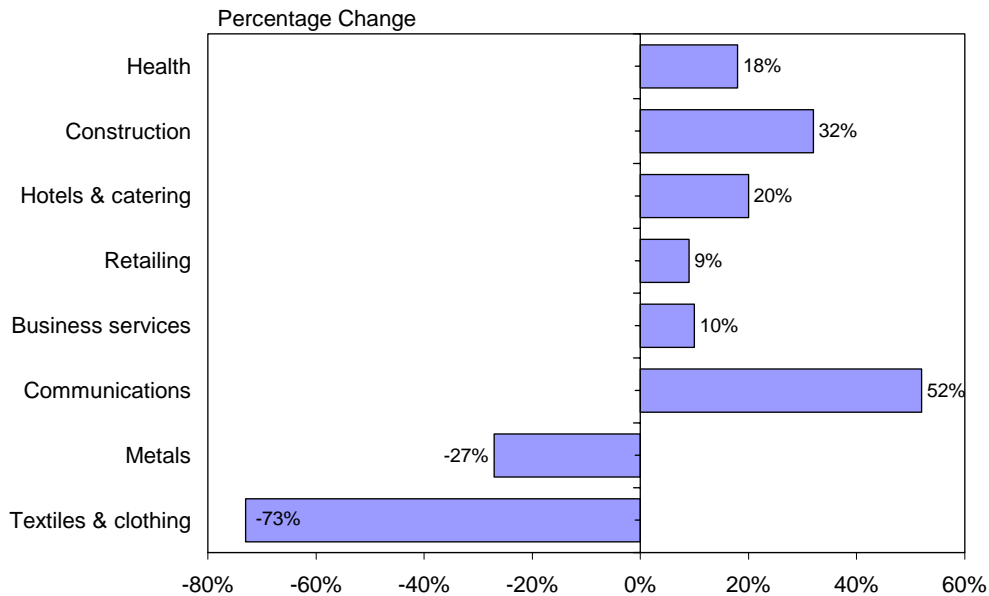
**Figure 2.5: Change in employment, Northumbria RBD, 1995 to 2002**



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 Communications sector grew at the greatest rate, increasing employment by 52 per cent.

**Figure 2.6: Percentage change in employment, Northumbria 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, 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.

Using the 2000 Index of Multiple Deprivation for England and Wales (produced by the Office of National Statistics), a collation of the 50 most deprived and the 50 least deprived wards by RBD can be used to as an indicator of deprivation within the Northumbria RBD.

12 wards in Northumbria were amongst the 50 most deprived wards in England. These are mainly around Middlesbrough and Newcastle.

The Regional Development Agency (RDA) 'One North East' provides a reasonable proxy of the Northumbria RBD and will be used to consider unemployment rate and qualifications.

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

The Northumbria 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 Northumbria RBD.

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

**Table 2.4 Claimant count and qualifications for major urban centres within the Northumbria RBD**

<b>Local Authority District</b>	<b>Claimant count (percentage)</b>	<b>Percentage of working age population with no qualifications</b>
Gateshead	3.1	17.5
Newcastle upon Tyne	3.2	18.0
North Tyneside	3.3	14.1
South Tyneside	4.9	17.0
Sunderland	3.0	20.1
Stockton on Tees	2.9	15.6
Hartlepool	4.2	21.5
Middlesbrough	4.6	20.8
Darlington	3.0	15.7
Durham	1.6	11.9
Sedgefield	2.6	24.6
UK Average	2.4	15.1

Source: NMIS

Based on major urban centres the Northumbria RBD has a proportion of JSA claimants above the UK Average. The proportion of working age population with no qualifications is also above the UK average.

Claimant count is highest in the urban centres of South Tyneside, Middlesbrough, and Hartlepool. The only urban centre to have a below average proportion of JSA claimants is Durham. The percentage of working age population without qualifications is high as almost one person in four in Sedgefield. Only one urban centre, North Tyneside, has a below UK average proportion of people without any qualifications.

## 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).

Figure 2.7 shows the main renewal initiatives and activities in the Northumbria RBD: the Neighbourhood Renewal Fund; Coalfield Communities; Pathfinders; and Urban Regeneration Companies. The figure also shows areas of substantial deprivation.

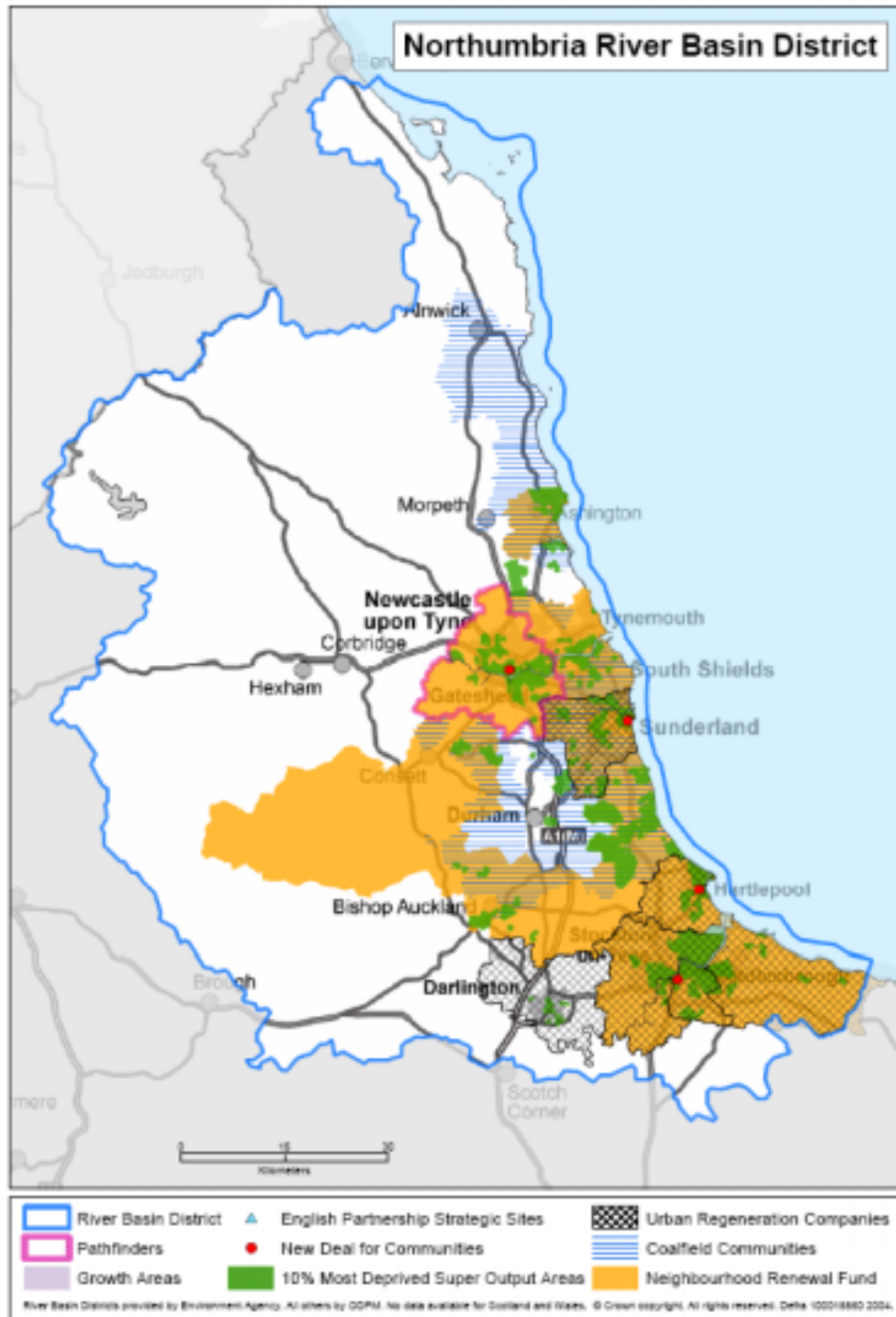
The relationship between ABIs and pressures and impacts in terms of the River Basin will not always be clear. There are complex interactions between the initiatives, main Government programmes, the wider economy and environment policy. They remain, however, an important component of the socio-economic 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.

As the map reveals, much of the Northumbria RBD falls under the Government's *Neighbourhood Renewal Fund* (NRF), particularly along the eastern edge of the RBD where many coalfield communities are located. 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<sup>1</sup>.

Much regeneration work is being carried out in these areas, led predominately by the Urban Regeneration Companies (URCs) between Darlington and Middlesbrough and around Sunderland. There is a high density of the 10 per cent most deprived Super Output Areas along this eastern edge of the RBD.

<sup>1</sup> Neighbourhood Renewal Unit, ODPM website.

Figure 2.7: Northumbria RBD area based initiatives



## **2.6 Trends in the Northumbria RBD economy**

Forecasts for the Northumbria 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 of 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* (RBC). Discussions with stakeholders reveals 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 Northumbria RBD population is forecast to continue to fall between 2002 and 2015 by 2.0 per cent. This is in contrast to the forecast average trend across all RBDs.

An increase in the number of households of over 45,200 is forecast between 2002 and 2015. This equates to an average increase of approximately 3,500 houses per annum.

The population per household is forecast to continue to decline between 2002 and 2015 in line with the average trend across all RBDs. This trend may have implications for water use per capita which would be expected to rise.

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

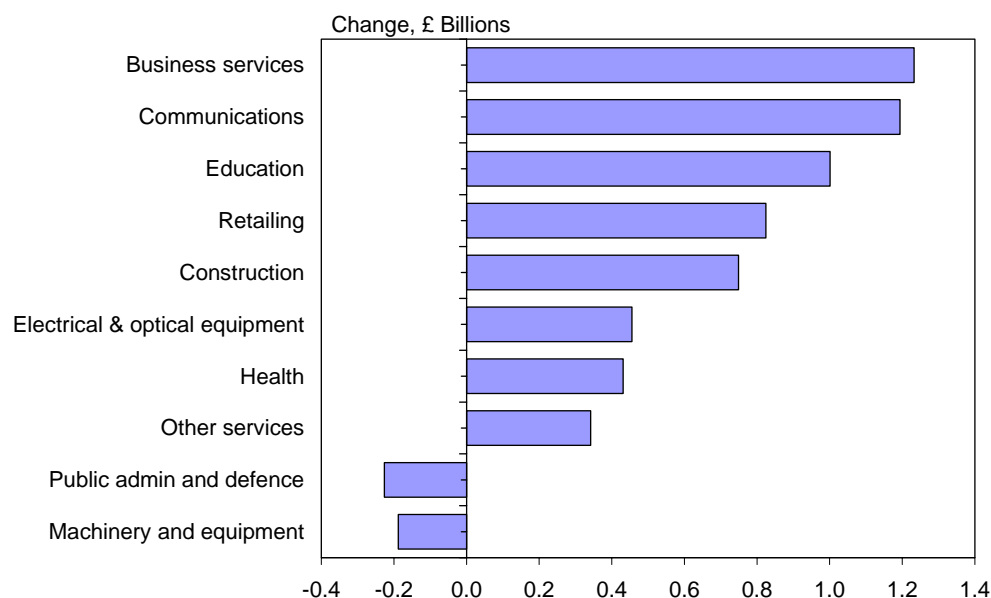
	2002	2015	Percentage change 2002-15	
<b>Population (000s)</b>				
Northumbria	2,514.2	2,464.6	Northumbria	-2.0
			All RBDs	4.6
<b>Households (000s)</b>				
Northumbria	1,074.1	1,119.3	Northumbria	4.2
			All RBDs	11.2
<b>Population per household</b>				
Northumbria	2.3	2.2	Northumbria	-5.9
			All RBDs	-5.9

Source: Experian Business Strategies Ltd

## 2.6.2 Output

Figure 2.8 illustrates the largest forecast changes in output for Northumbria RBD from 2002 to 2015. Output is forecast to increase by £7.3 billion, or 27.9 per cent. This equates to an annual increase of 1.9 per cent per annum. The forecasts show a continuing increase in output across many sectors with the largest growth in terms of value being in the Business services and Communications sectors.

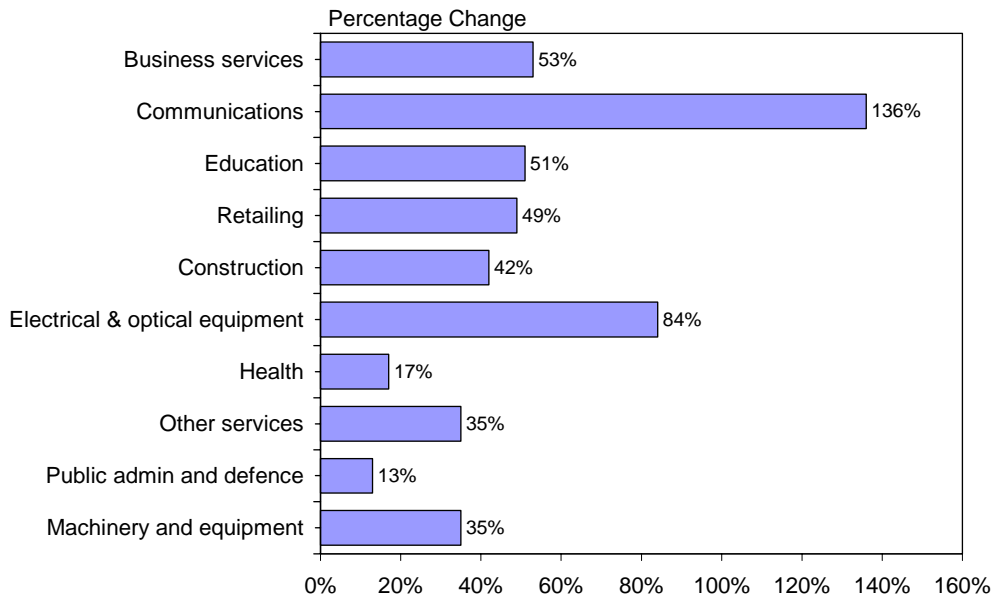
**Figure 2.8: Forecast change in output, Northumbria RBD, 2002 to 2015**



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 53 per cent. The highest rate of growth is forecast in the Communications sector, which is anticipated to grow by 136 per cent between 2002 and 2015.

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



Source: Experian Business Strategies Ltd

### 2.6.3 Employment

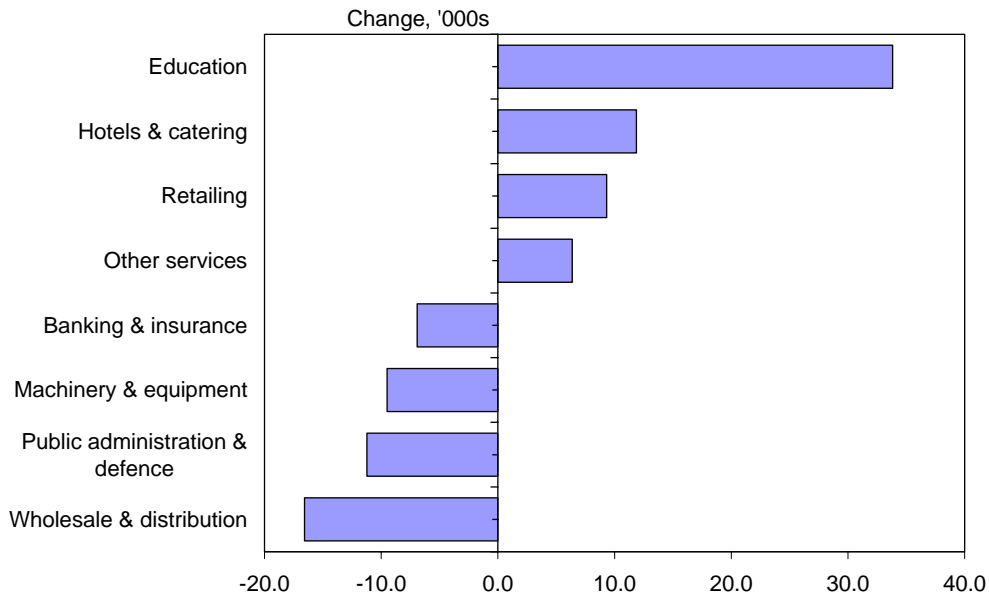
Overall, employment in the Northumbria RBD is forecast to decline by approximately 13,000 between 2002 and 2015.

Some sectors are forecast to increase during this period, however. The largest forecast increase in employment is anticipated in the education sector which is anticipated to increase employment by 33,800. Significant growth is also expected in the Hotels & catering sector and the Retailing sector.

Several sectors are forecast to decline between 2002 and 2015 with the largest fall forecast for the Wholesale & distribution sector. Services sectors such as banking & insurance and public administration & defence are all also forecast to experience a fall in employment levels in the Northumbria RBD.

The employment sectors forecast to undergo significant changes between 2002 and 2015 are illustrated in Figure 2.10 below.

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

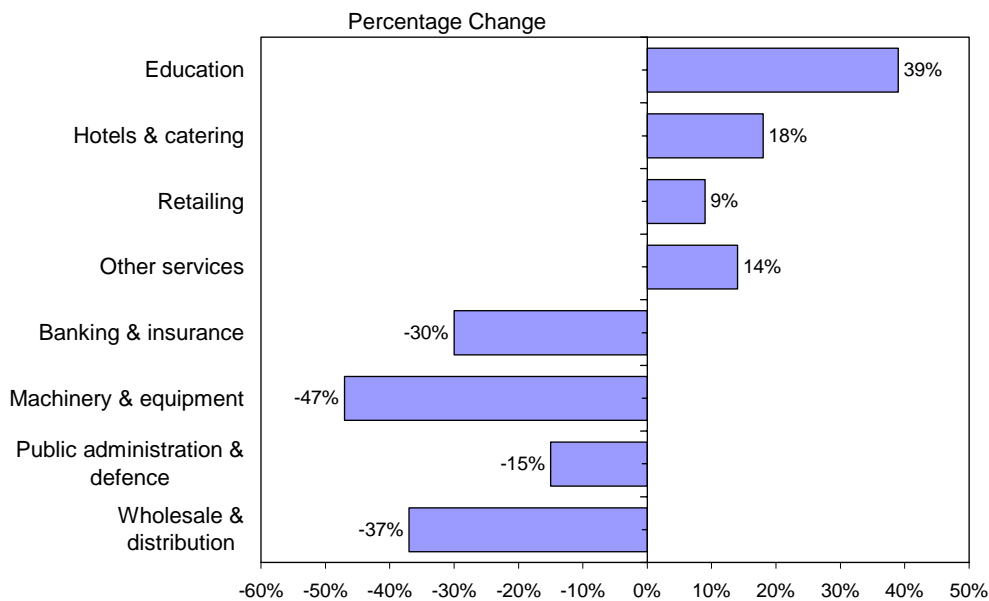


Source: Experian Business Strategies Ltd

Figure 2.11 outlines the percentage change in employee numbers between 2002 and 2015 for the sectors illustrated in Figure 2.10. Education, the sector forecast to grow by the largest number of employees is also forecast to grow at the highest rate with an increase in employment of 39 per cent anticipated.

The most significant employment losses are forecast in the Machinery & equipment and Wholesale & distribution sectors.

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



Source: Experian Business Strategies Ltd

A full list of forecasts for both employment and output for the Northumbria RBD is attached in 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 North East region's *Regional Economic Strategy*, where priority is given to the development of fourteen regional clusters based around a wide range of sectors (automotive, base chemicals, bioscience, clothing and textiles, creative industries, defence and precision engineering, digital, electronics, environmental industries, food and drink, nanotechnology, offshore, pharmaceuticals and speciality chemicals and tourism). A number of strategic locations have been earmarked around the region to provide high quality sites and buildings for inward investment and indigenous business growth. The majority of these are on brownfield or greenfield sites earmarked for development for many years. Key development sites include Newcastle Great Park, Newburn Riverside in west Newcastle (one of the UK's largest brownfield reclamation schemes). Other significant sites are associated with the Urban Regeneration Companies in Sunderland and the Tees Valley and other local regeneration initiatives, such as the A19/A189 *Corridor of Opportunity*.

## 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 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 illustrates the Northumbria RBD abstractions by purpose in order of magnitude. The basis for the table 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)<sup>1</sup>, however it should be noted that these daily figures do not reflect seasonal variations in water use.

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

<sup>1</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.

period, 2005-2010. In future years, sustainability reductions are likely to impact on abstraction levels.

The main abstractors in the Northumbria RBD are the water, manufacturing and agricultural industries. 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 level of abstraction in the Northumbria RBD from these industries is considerably below the average level for all RBDs.

**Table 3.1: Northumbria RBD abstractions**

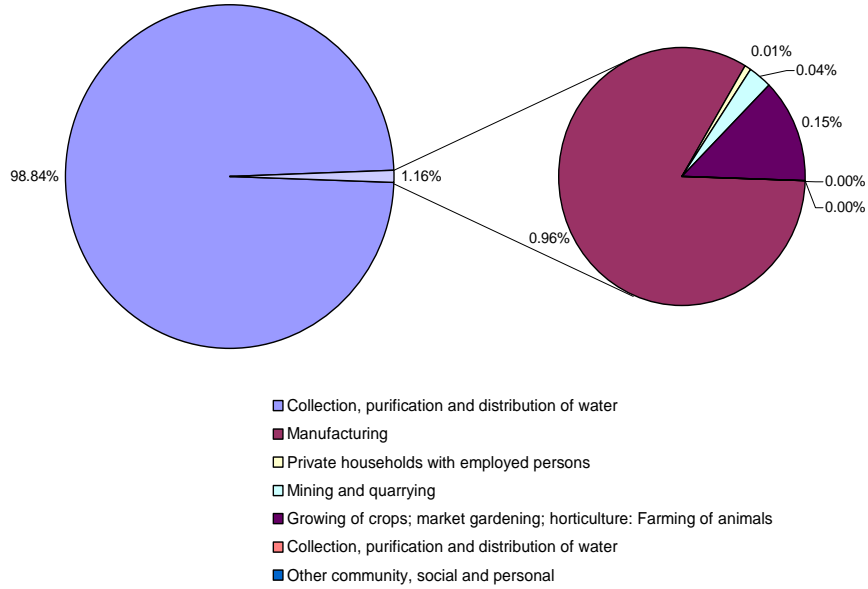
SIC section	Abstraction source	Additional information	Volume abstracted (MI/d)	Percentage of Northumbria RBD abstractions
E41.00	Collection, purification and distribution of water	Public Water Supply (total abstracted)	1012.6	98.78%
D	Manufacturing	General Industry (Manufacturing)	9.9	0.96%
A01	Growing of crops; market gardening; horticulture: Farming of animals	Spray Irrigation included	1.6	0.15%
L	Public Administration & defence, Education, Health	Public Administration & defence, Education, Health	0.5	< 0.10%
C	Mining and quarrying	Mining & Aggregates	0.4	< 0.10%
O92	Recreational, cultural and sporting activities	Recreation (including sports)	0.1	< 0.10%
P	Private households with employed persons	Other Potable Uses	0.1	< 0.10%
	Amenity	Amenity	0.0	< 0.10%
E40.10	Production and distribution of electricity	Power Generation	0.0	< 0.10%
F	Construction	Construction	0.0	< 0.10%
H	Hotels and restaurants	Hotels, Public Houses and Conference centres	0.0	< 0.10%
O (excluding O92)	Other community, social and personal	Other (including Environmental)	0.0	< 0.10%
E41.00	Collection, purification and distribution of water	Licensed transfers for PWS	0.0	< 0.10%
Total			1025.2	100%

Source: Environment Agency, 2004

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: Northumbria RBD abstractions**



Source: Environment Agency, 2001

### 3.1.2 Discharges

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

Table 3.2 summarises the main categories of consented discharges for the Northumbria RBD in numerical terms. The table shows the number of consents rather than volumes. The major sources of discharges for the Northumbria 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 Northumbria RBD and the level of household water use.

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

Discharge	Number of consents	Percentage of total consents in RBD
Sewage treatment works	698	57.93%
Sewage – treated effluent	264	21.91%
Manufacture and use of organic chemicals	71	5.89%
Trade – treated effluent	28	2.32%
Inorganic chemical processes	27	2.24%
Petrochemical processes	26	2.16%
Processes involving halogens	16	1.33%
Petroleum processes	15	1.24%
Carbonisation and associated processes	11	0.91%
Combustion processes	9	0.75%
Chemical fertiliser production	7	0.58%
Acid processes	4	0.33%
Trade – fish aquaculture	4	0.33%
Trade - minewater	4	0.33%
Cement/lime manufacture and associated processes	3	0.25%
Recovery processes	3	0.25%
Trade – site drainage (contaminated S/W)	3	0.25%
Sewage – storm effluent	2	0.17%
Tar and bitumen processes	2	0.17%
Trade - aquaculture	2	0.17%
Trade - leachate	2	0.17%
Unknown	2	0.17%
Gasification and associated processes	1	0.08%
Trade – filter backwash	1	0.08%
Total	1205	100%

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.

Where the presence of a hard defence is not currently impacting the status of a water body, consideration must be given as to how, or if, defences are likely to cause a deterioration in those elements that define Status, and thus impact on the objectives of the WFD. Of particular concern is the phenomenon of coastal squeeze, where rising sea levels meet an artificial fixed landward boundary and cause, or exacerbate the erosion of saltmarsh.

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 Northumbria RBD, land reclamation, shoreline reinforcing, navigation dredging and barrages are significant morphological alterations. Land reclamation is human activity that may have reclaimed low-lying areas from the sea. Shoreline defences include embankments, sea walls and culverts. Barrages are also present in the Northumbria RBD. There are also pressures from navigation dredging in the Northumbria RBD, most probably related to navigation along the River Tyne and the Newcastle port.

There is an SIC category that covers the construction of all water projects and includes ports, jetties, lochs and dredging. This sector is reasonably small in the Northumbria RBD but is expected to grow moderately over the period to 2015.

## 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 Northumbria RBD. These are grouped in terms of households, industry and agriculture.

### 3.2.1 Households

Housing growth is a significant issue in the UK with a forecast growth in households of around 180,000 per year over the next 20 years. Population growth accounts for 57 per cent of this growth, with the remainder due to changing household patterns, for example smaller and one-person households. This is a trend borne out in the Northumbria RBD. Housing figures are not currently available on a river basin basis - but rather are produced on a Government Office region basis. These show a net oversupply of 14,000 homes over new households in the period 1999-04 in the Government Office Regions (GOR) covering the Northumbria RBD. As a result, some parts of the region are experiencing weak local housing markets, which are being addressed by *Housing Market Renewal* pathfinders and other policy tools (See Figure 2.7). These use a combination of refurbishment, selective demolition, planning restraint and urban remodelling to make the areas more popular and bring housing supply into a better balance with sub-regional demand levels. These are likely to reduce the rate of local population loss in these areas and, supported by *Regional Spatial Strategies*, support the historic settlement hierarchies. However, their impact on water supply, waste water and sewerage infrastructure is expected to be limited.

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 Northumbria 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 Northumbria RBD, forecasts related to the following companies: Anglian Water and Northumbrian 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>1</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

<sup>1</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)

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 Plan* (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 is 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.

### **3.2.2 Industry**

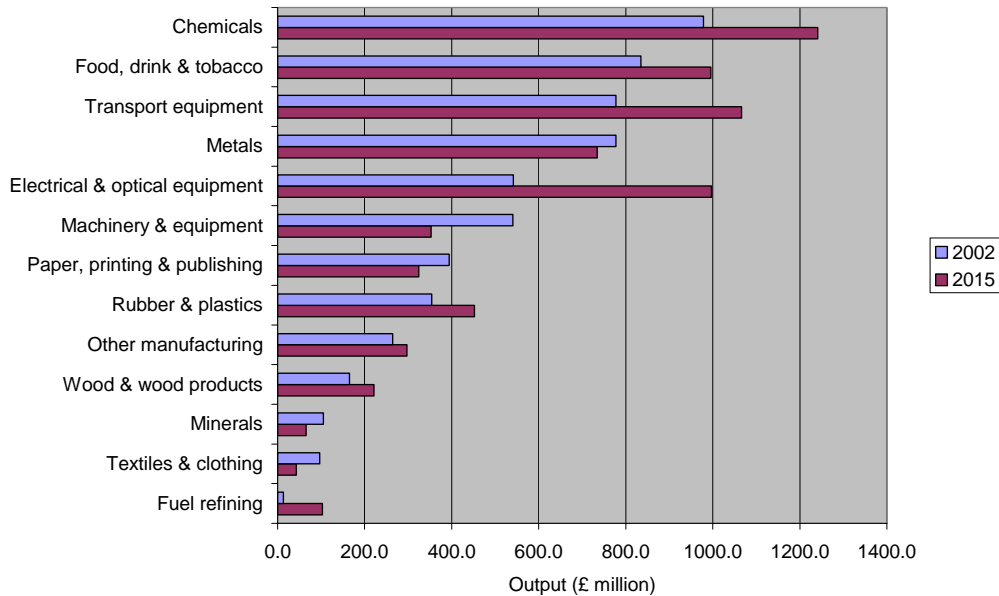
Manufacturing accounts for 9.9 megalitres per day of abstractions. This is the second largest source of abstractions in the Northumbria RBD but accounts for just 0.35 per cent of such abstractions across all RBDs.

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 3.2 below.

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



Source Experian Business Strategies Ltd

Between 2002 and 2015 the manufacturing sector in Northumbria is forecast to grow by over £7 billion, an increase of 1.9 per cent per annum. The significant growth sectors include:

- Electrical & optical equipment;
- Chemicals;
- Transport equipment; and
- Food, drink & tobacco.

The Northumbria RBD contains some important ports including the port of Tyne. 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 Northumbria RBD. Over a quarter of all shipping exports are handled at ports within the RBD, predominately through the ports of Tees and Hartlepool.

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

	Flow (000s tonnes)	Percentage of all RBD port movement	RBD rank
<b>Goods in 2002</b>	18 918	6.92%	7 <sup>th</sup>
<b>Goods out 2002</b>	36 302	25.67%	1 <sup>st</sup>
<b>All foreign &amp; domestic traffic 2002</b>	55 220	13..51%	4 <sup>th</sup>
<b>Passenger movements 2002</b>	816	2.84%	6 <sup>th</sup>

The main ports within the Northumbria RBD include:

- Tees and Hartlepool – throughput (2002) of 50,447,000 tonnes;
- Tyne – throughput (2002) of 2,656,000 tonnes; and
- Sunderland – throughput (2002) of 928,000 tonnes.

Tees and Hartlepool is the third largest port in the UK and over two thirds of throughput was bulk fuels in 2002. Other significant traffic include ores and scrap, chemicals, fish, freight ferries and containers. Tyne handles a mixture of traffic and is the only port in the region to offer year round ferry services to the Netherlands, Norway and Sweden. Cruise calls and motor vehicle trades are growing sectors. Sunderland handles a mix of bulk and general cargo.

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 Northumbria RBD output from sea and coastal water transport is forecast to increase from £6.9 million in 2002 to £7.6 million in 2015. This is an increase of 11.1 per cent.

Output from inland water transport is also forecast to grow from £1.0 million in 2002 to £1.4 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 0.4 per cent per annum is forecast over this period.

An in-depth agriculture *Business as Usual* (BAU) study for the WFD was undertaken by Cambridge University (ref 2). The study provides quantitative percentage changes of key agricultural activities to 2015 at national and 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 Agriculture Policy* reform), rationalisation within the industry, technological change and macroeconomic factors.

The Northumbria RBD is generally within the North East Government Office Region. The key projected trends for major commodities in the Northumbria RBD are:

- Removal of set-aside brings land into arable production;
- Small increase in cereal production (particularly wheat and oilseed rape) 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 potatoes).

Overall a small fall in overall 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 *Cost Recovery and Incentive Pricing (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 Directive. This section provides information on the current levels of the recovery of the costs of water services in the Northumbria RBD to assist in this process<sup>1</sup>. The following sections outline:

- How water services are defined and how they relate to the Northumbria RBD;
- Who provides and who contributes to the cost of water services (users and polluters) in the Northumbria 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>1</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 Northumbria RBD

Water Services are defined by the WFD 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.

Two water companies operate in the Northumbria RBD. The estimated proportion of each company’s customer households falling within the RBD is provided in brackets:

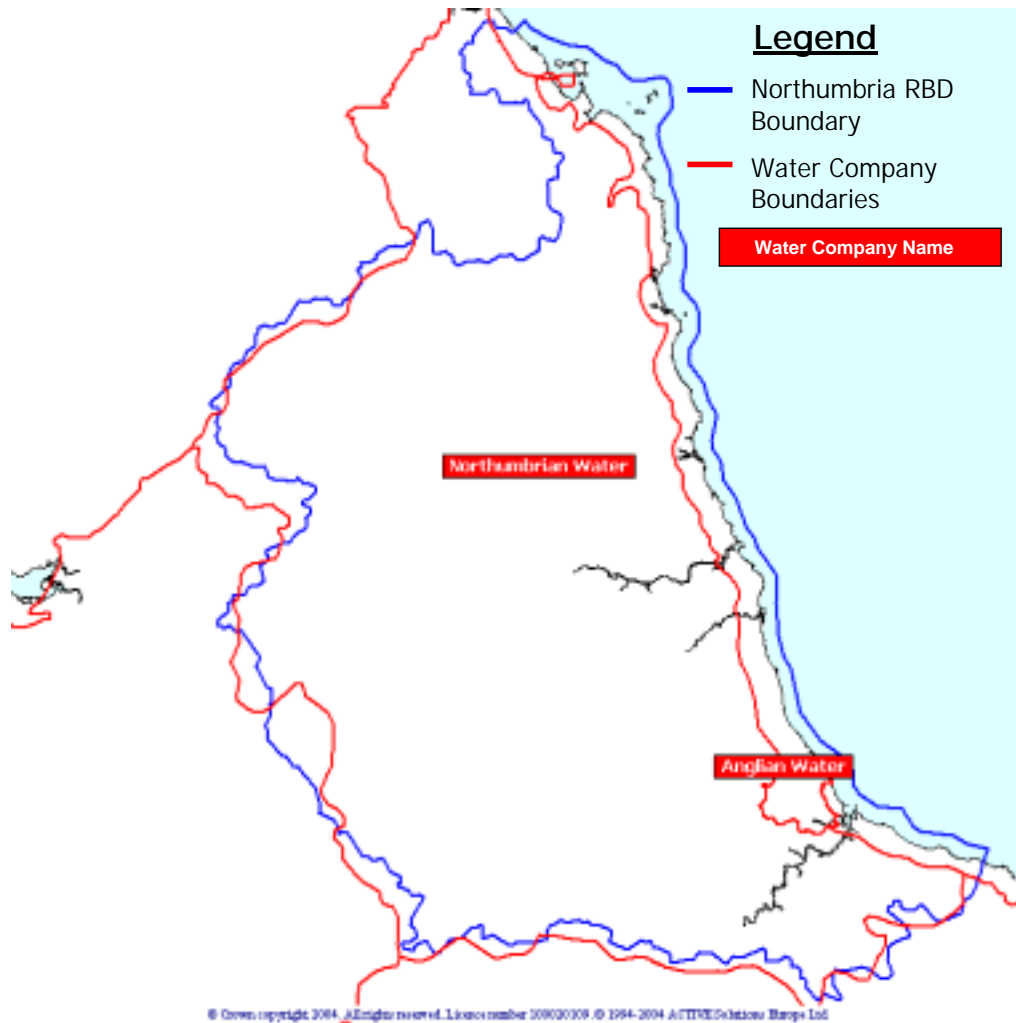
- Anglian Water (through its subsidiary Hartlepool Water) (2.02 per cent); and
- Northumbrian Water (58.1 per cent)

There is one sewerage service company operating in the Northumbria RBD. The estimated proportion of the company’s customer households falling within the RBD is provided in brackets:

- Northumbrian Water (98.3 per cent)

The water service areas of these companies do not coincide with the Northumbria RBD. For instance, the majority of Northumbrian Water’s customers are within the RBD, with only a small proportion of Anglian Water’s customers are within the District.

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



Ultimately, the analysis of cost recovery needs to be undertaken at 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 Northumbria 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. The figures are provided for indicative purposes only.

## 4.3 Water service providers, users and polluters

### 4.3.1 Service providers

Anglian Water Services and Northumbrian Water all provide water services within the Northumbria 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.) (ref 3). In addition information related to business plans, investments, costs and prices for the period 2005-2010 can be found in the *Future Water and Sewerage Charges 2005-10: Final Determination*<sup>1</sup> report published by Ofwat.

In addition to the water service companies in the Northumbria RBD listed above, there are 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>2</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 and 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>3</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 Northumbria RBD, but estimates are available for the North East Government Office Region which broadly includes the area of the Northumbria RBD. The estimated number of households that do not receive mains water from the statutory water service companies in this region is 32,000 or 3.0 per cent of total households.

<sup>1</sup> *Future Water and Sewerage Charges 2005-10: Final Determinations*, Ofwat, 2004.  
[http://www.ofwat.gov.uk/aptrix/ofwat/publish.nsf/Content/pr04fd\\_companyletters](http://www.ofwat.gov.uk/aptrix/ofwat/publish.nsf/Content/pr04fd_companyletters)

<sup>2</sup> The approach to defining water services is set out in the *Cost Recovery and Incentive Pricing* (CRIP) report.

<sup>3</sup> *Private water services and self-services: A review of current information and trends for England & Wales*, A Report for Defra, Stone & Webster Consultants, 2005.

Private sewerage can involve the collection of wastewater, the treatment of sewage effluents and the discharge of treated wastewater to watercourses and the safe disposal of sludge (waste products from treatment processes). It has been estimated that there are between 80,000 to 200,000 kilometres of private sewers in England and Wales and nearly half of all household properties are served by private sewers or lateral drains<sup>1</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 Northumbria RBD, although for the broadly equivalent Government Office Region the figures are relatively low at about 9,000 (0.9 per cent) household properties. However, this obscures a high concentration in the Northumberland local authority area (6 per cent), which is predominately rural.

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 figures for the North East EA region is 39 per cent, which is consistent with a concentration of large industrial dischargers on the Tyne and Tees estuaries. 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 is not currently collated within the correct geographical boundaries 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.

<sup>1</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.

### 4.3.2 Water users

Water use is defined by the WFD 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 (megalitres per day).

There are estimated to be 1.1 million households and 72,000 non-households provided with water services by water companies in the Northumbria RBD.

**Table 4.1a: Characteristics of water services, 2003-04**

Company	H/holds	Non-h/holds	Population (H/holds)	Population (non-h/hold)	Volume
	('000)	('000)	('000)	('000)	(MI/day)
Anglian Water	1,802	127	4,080	77	1,174
Northumbrian Water	1,788	120	4,142	63	481
Total	3,591	247	8,222	140	1655
Allocated to Northumbria RBD	1,076	72	2,491	38	303

Source: Annual Returns submitted by water companies to Ofwat

There are estimated to be 1.1 million households and 58,000 non-households provided with sewerage services by Northumbrian Water in the Northumbria 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)
Northumbrian Water	1,069	59	2,521	47	500
Total	1,069	59	2,521	47	500
Allocated to Northumbria RBD	1,051	58	2,478	46	492

Source: Annual Returns submitted by water companies to Ofwat

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

These are the large users (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 currently no 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>
Anglian Water Services	188	54,291	14	9,363
Northumbrian Water	179	107,304	2	14,892

**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>
Northumbrian Water	78	8,922	4	148

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

<b>Company</b>	<b>Customers</b>	<b>Sewerage collected (MI pa)</b>	<b>Special agreement Customers<sup>1</sup></b>	<b>Special agreements sewerage collected (MI pa)<sup>1</sup></b>
Northumbrian Water	94	3,427	3	0

### **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.

### **Other**

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

<sup>1</sup> Consumption per annum is not specified as above 50MI for these customers.

### 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.

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 company's 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 how much of these annual costs are attributable to external sources, in this case the agricultural sector<sup>1</sup>.

The estimates suggest that currently around £326.7 million 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 £227.5 million of this is attributable to the external impacts of the agricultural sector on raw water quality. Based on the population allocation procedure, around £22.4 million of these costs arise within the Northumbria 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>1</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)**

	<b>Annual costs borne by water company customers</b>	<b>Percentage contribution due to external sources</b>	<b>Total annual remediation costs attributable to external sources</b>	<b>Allocated costs in the Northumbria RBD</b>
<b>Capital costs</b>				
Nitrates	18.1	80%	14.5	0.5
Pesticides	72.1	89%	64.2	0.3
Other parameters	126	50%	63.0	9.0
<i>Cryptosporidium</i>	37.2	90%	33.5	9.9
<b>Subtotal</b>	<b>253.4</b>		<b>175.1</b>	<b>19.7</b>
<b>Opex</b>				
Deteriorating raw water quality	64.7	69%	44.6	2.6
<i>Cryptosporidium</i>	8.6	90%	7.7	0.2
<b>Total</b>	<b>73.3</b>		<b>52.4</b>	<b>2.8</b>
<b>Grand total</b>	<b>326.7</b>		<b>227.5</b>	<b>22.4</b>

Source: *Cost Recovery and Incentive Pricing* report (CRIP) (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 Northumbria 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 [Ref 3] and information collated by Ofwat from water companies.

In 2003-04 the financial costs of the water and sewerage services were £149.5 million and £184.7 million for the Northumbria RBD. These are based on population allocation.

**Table 4.4: Northumbria RBD – public water supply – total financial costs (£m, 2003-04 prices)**

<b>Water Company</b>	<b>Percentage of population in RBD</b>	<b>1998-99</b>	<b>1999-00</b>	<b>2000-01</b>	<b>2001-02</b>	<b>2002-03</b>	<b>2003-04</b>
Anglian Water	2.0%	338.0	324.5	292.0	298.0	289.4	300.9
Northumbrian Water	58.2%	300.9	288.4	250.2	254.6	247.5	246.7
<b>Allocated Total Financial Costs</b>		<b>181.8</b>	<b>174.2</b>	<b>151.4</b>	<b>154.0</b>	<b>149.8</b>	<b>149.5</b>

Source: Ofwat

**Table 4.5: Northumbria RBD – sewerage service – total financial costs (£m, 2003-04 prices)**

<b>Water Company</b>	<b>Percentage of population in RBD</b>	<b>1998-99</b>	<b>1999-00</b>	<b>2000-01</b>	<b>2001-02</b>	<b>2002-03</b>	<b>2003-04</b>
Northumbrian Water	98.3%	211.0	236.1	184.5	189.8	187.5	187.9
<b>Allocated Total Financial Costs</b>		<b>207.4</b>	<b>232.1</b>	<b>181.4</b>	<b>186.5</b>	<b>184.3</b>	<b>184.7</b>

Source: Ofwat

The following tables summarise the unit financial costs of the companies operating in the Northumbria 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 £0.65 per m<sup>3</sup> and for the sewerage service £1.03 per m<sup>3</sup>.

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

<b>Water Company</b>	<b>Percentage of Population in RBD</b>	<b>1998-99</b>	<b>1999-00</b>	<b>2000-01</b>	<b>2001-02</b>	<b>2002-03</b>	<b>2003-04</b>
Anglian Water	2.0%	0.92	0.89	0.81	0.83	0.79	0.82
Northumbrian Water	58.2%	0.76	0.74	0.65	0.66	0.65	0.64
<b>Allocated total financial costs</b>		<b>0.77</b>	<b>0.75</b>	<b>0.66</b>	<b>0.66</b>	<b>0.65</b>	<b>0.65</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: Northumbria RBD – sewerage service – unit financial costs (£/m<sup>3</sup>, 2003-04 prices)**

<b>Water Company</b>	<b>Percentage of population in RBD</b>	<b>1998-99</b>	<b>1999-00</b>	<b>2000-01</b>	<b>2001-02</b>	<b>2002-03</b>	<b>2003-04</b>
Northumbrian Water	98.3%	1.09	1.23	0.96	1.00	1.02	1.03
<b>Allocated Total Financial Costs</b>		<b>1.09</b>	<b>1.23</b>	<b>0.96</b>	<b>1.00</b>	<b>1.02</b>	<b>1.03</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 (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 Northumbria results.<sup>1</sup>

Column 1 shows the percentage of the water companies' costs which are attributed (on an indicative basis) to the Northumbria RBD. Column 2 shows the capital expenditure recorded as being spent on environmental mitigation of sewerage services. In Northumbrian Water Ltd, these have amounted to £1 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 Northumbria RBD. As table 4.8 shows, the capital expenditure incurred in the Northumbria RBD is in the region of £1 billion. Taken together with the

<sup>1</sup> Note that the results are sensitive to the assumptions that Ofwat adopted in its analysis.

operating expenditure this means that around £94 million of the water service providers' costs are associated with mitigating environmental impacts of sewerage services per annum.

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

<b>Company</b>	<b>Percentage of company costs allocated to RBD</b>	<b>Capex (1989-03)- £m</b>	<b>Cost pa-£m</b>	<b>Capex allocated (1989-03)- £m</b>	<b>Cost pa-allocated-£m</b>
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4=1*2</b>	<b>5=1*3</b>
Northumbrian Water Ltd	98%	1,052	96	1,034	94
<b>Total</b>				<b>1,034</b>	<b>94</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 customers pay is not related to levels of water consumption. Detailed information on these tariffs for the relevant water companies operating in the Northumbria RBD can be found in the *Ofwat Tariff Structure and Charges 2004 – 2005* report (1) .

The breakdown of metered and non-metered households in 2003-04 and projection for 2009-10 are given in Table 4.9 below. This table presents metering information for all water and sewerage companies operating in the Northumbria RBD, rather than for all households and non-households in the Northumbria RBD. As such, the table below provides indicative information only on the level of metering in the Northumbria RBD.

**Table 4.9: Percentage of water and sewerage customers taking metered supplies, Northumbria RBD**

	Anglian Water Services		Northumbrian Water	
	2003-04	2009-10	2003-04	2009-10
<b>Water</b>				
Household %	51.4	63.41	9.6	31.6
Non-household %	87.4	94.6	78.5	90.4
<b>Sewerage</b>				
Household %			9.2	20.2
Non-household %			63.1	72.4

Source: Ofwat, *Tariff Structure and Charges 2004-05*.

Note: Metering for Hartlepool Water, the subsidiary of Anglian Water Services in Northumbria RBD, is likely to be substantially lower than for the average of Anglian Water Services – in a report produced for Water Voice in 2004 it was estimated that 9% of households and 70% on non-households were metered.

(1) 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)

Revenue for companies comes 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>1</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 total 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, investment time profile, specific levels of operating expenditure) when setting the price limits at Final Determinations and on projected *status quo* revenues.

Companies' incurred costs might differ from the Ofwat assumed ones, in any given year, giving origin to some of the discrepancies between costs and revenues. Furthermore, changes, for instance in the assumptions underpinning revenue projections used at Final Determinations, could result in lower revenues than expected and thereby create an imbalance between total costs and total revenues in specific years.

However, the balance between costs and revenues is necessarily achieved over a longer time horizon in the economic regulatory regime in England and Wales. 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.

<sup>1</sup> The approach to defining the cost recovery rate is explained in the report on *Cost Recovery and Incentive Pricing* (CRIP) (ref 3). This is a complicated area, but in very general terms the rate is defined as revenues less subsidies divided by cost.

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

Cost component	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04
<b>Total revenues</b>	180.4	172.8	149.7	153.6	149.3	150.0
<i>Subsidies</i>	0.0	0.0	0.0	0.0	0.0	0.0
<b>Total financial costs (inclusive of taxes)</b>	181.8	174.2	151.4	154.0	149.8	149.5
<b>Cost recovery rate</b>	<b>99%</b>	<b>99%</b>	<b>99%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

Source: Ofwat

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

Cost component	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04
<b>Total revenues</b>	209.0	233.0	181.0	186.1	183.9	185.2
<i>Subsidies</i>	0.0	0.0	0.0	0.0	0.0	0.0
<b>Total financial costs (inclusive of taxes)</b>	207.4	232.1	181.4	186.5	184.3	184.7
<b>Cost recovery rate</b>	<b>101%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

Source: Ofwat

Water companies (and other abstractors and dischargers) pay abstraction and discharge fees for the water they abstract to use and on-sell 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 an application charge for every new or varied 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 some 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 Water Prices* (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 PR04, the remaining quantified environmental damage costs caused by water pollution and abstraction in England and Wales will be about £1 -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>1</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 groundwater.

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

These estimates do not relate fully to the issues to be addressed in the WFD. It does not include important issues and environmental pressures identified by

<sup>1</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)

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 our estimates, they might underestimate the environmental and resource costs of water use. On the other hand there are countervailing methodological and empirical reasons why they might be over-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 current 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 adequacy of the recovery of costs, 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 Northumbria 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 programmes of measures (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 on:

- *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.

It 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 different sectors that will need to be appraised in River Basin Management Plans (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 specify clearly 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>1</sup>.

<sup>1</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 Ltd, 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)*. Data sources were identified in Annex G – Data Audit File of this report (ref 1). In addition, profiles of economic sectors and trends in their water use were compiled and included in 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* (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 Northumbria RBD.

### **Government office regions**

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

### **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 Ltd for the Northumbria 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	1995-02	2002-15
				(per cent)	(per cent)	(per cent)	(per cent)	(per cent)
	(000s)	(000s)	(000s)					
<b>Total population</b>	2,574	2,514	2,465				-0.3	-0.2
<b>Total households</b>	1,046	1,074	1,119				0.4	0.3

Employees in Employment	1995	2002	2015	Share of economy			Annual average growth	
				1995	2002	2015	1995-02	2002-15
Standard 30 categories	(000s)	(000s)	(000s)	(per cent)	(per cent)	(per cent)	(per cent)	(per cent)
Agriculture, forestry & fishing	7.5	8.4	6.8	0.8	0.9	0.7	1.7	-1.6
Oil & gas extraction	0.4	1.3	1.0	0.0	0.1	0.1	16.9	-2.6
Other mining	2.9	2.2	1.2	0.3	0.2	0.1	-4.2	-4.2
Gas, electricity & water	6.0	5.2	3.4	0.6	0.5	0.4	-2.0	-3.2
Fuel refining	0.5	0.1	0.8	0.1	0.0	0.1	-22.3	18.9
Chemicals	17.7	13.7	11.1	1.9	1.4	1.2	-3.6	-1.6
Minerals	6.3	3.4	1.8	0.7	0.4	0.2	-8.4	-4.8
Metals	33.3	24.4	22.1	3.6	2.5	2.3	-4.3	-0.7
Machinery & equipment	20.7	20.2	10.7	2.2	2.1	1.1	-0.3	-4.8
Electrical & optical equipment	20.6	15.0	14.2	2.2	1.6	1.5	-4.5	-0.4
Transport equipment	13.9	19.3	17.2	1.5	2.0	1.8	4.8	-0.9
Food, drink & tobacco	15.3	17.5	17.4	1.7	1.8	1.8	1.9	0.0
Textiles & clothing	21.5	5.8	2.0	2.3	0.6	0.2	-17.2	-7.9
Wood & wood products	3.6	4.4	5.0	0.4	0.5	0.5	2.7	1.0
Paper, printing & publishing	12.6	9.9	7.3	1.4	1.0	0.8	-3.3	-2.4
Rubber & plastics	11.9	13.2	12.1	1.3	1.4	1.3	1.6	-0.7
Other manufacturing	9.0	9.9	9.9	1.0	1.0	1.0	1.3	0.0
Construction	46.7	61.5	64.9	5.1	6.4	6.8	4.0	0.4
Retailing	93.4	101.7	111.0	10.1	10.6	11.7	1.2	0.7
Wholesale & distribution	50.3	44.9	28.4	5.4	4.7	3.0	-1.6	-3.5
Hotels & catering	53.5	64.3	76.2	5.8	6.7	8.0	2.7	1.3
Transport	33.2	32.2	27.7	3.6	3.4	2.9	-0.4	-1.2
Communications	12.1	18.5	21.0	1.3	1.9	2.2	6.2	1.0
Banking & insurance	24.2	23.4	16.5	2.6	2.4	1.7	-0.5	-2.7
Business services	83.3	91.4	87.0	9.0	9.5	9.2	1.3	-0.4
Other financial & business services	12.8	15.6	11.8	1.4	1.6	1.2	2.8	-2.1
Public administration & defence	70.0	73.1	61.9	7.6	7.6	6.5	0.6	-1.3
Education	81.8	86.0	119.8	8.9	8.9	12.6	0.7	2.6
Health	109.7	129.3	126.5	11.9	13.5	13.3	2.4	-0.2
Other services	48.6	45.5	51.9	5.3	4.7	5.5	-0.9	1.0
<b>Total employees</b>	<b>923.6</b>	<b>961.4</b>	<b>948.7</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>0.6</b>	<b>-0.1</b>

Employees in employment-disaggregated categories	1995 (000s)	2002 (000s)	2015 (000s)	Share of economy			Annual Average Growth	
				1995 (per cent)	2002 (per cent)	2015 (per cent)	1995-02 (per cent)	2002-15 (per cent)
Electricity, gas, steam & hot water supply (SIC40)	4.8	4.1	2.6	0.5	0.4	0.3	-2.5	-3.3
Production & distribution of electricity (SIC40.1)	3.4	3.2	2.1	0.4	0.3	0.2	-0.6	-3.2
Manufacture of gas (SIC40.2)	1.5	0.8	0.5	0.2	0.1	0.1	-7.8	-3.8
Steam & hot water supply (SIC40.3)	0.0	0.0	0.0	0.0	0.0	0.0	#DIV/0!	#DIV/0!
Collection, purification & distribution of water (SIC41)	1.2	1.2	0.8	0.1	0.1	0.1	0.0	-2.8
Manufacture of basic chemicals (SIC24.1)	9.1	6.8	4.7	1.0	0.7	0.5	-4.0	-2.9
Manufacture of pesticides & other agro-chemicals (SIC24.2)	0.0	0.0	0.0	0.0	0.0	0.0	-3.8	-4.7
Manufacture of paints & varnishes etc. (SIC24.3)	1.9	1.6	1.5	0.2	0.2	0.2	-2.6	-0.5
Manufacture of pharmaceuticals (SIC24.4)	3.5	2.7	2.7	0.4	0.3	0.3	-3.6	0.1
Manufacture of soaps & detergents (SIC24.5)	1.4	1.3	1.0	0.1	0.1	0.1	-1.3	-2.0
Manufacture of other chemical products (SIC24.6)	1.7	1.3	1.1	0.2	0.1	0.1	-4.0	-0.8
Manufacture of man made fibres (SIC24.7)	0.1	0.0	0.1	0.0	0.0	0.0	-13.9	2.1
Manufacture of basic metals (SIC27)	11.1	8.3	8.1	1.2	0.9	0.9	-4.0	-0.2
Manufacture of pulp, paper & paper products (SIC21)	4.5	3.1	2.1	0.5	0.3	0.2	-5.3	-2.7
Mining of coal & lignite (SIC10)	1.3	0.7	0.5	0.1	0.1	0.0	-8.2	-3.4
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	#DIV/0!	#DIV/0!
Other mining (SIC14)	1.6	1.4	0.8	0.2	0.2	0.1	-1.5	-4.6
Sewage & refuse disposal (SIC90)	2.9	3.5	3.9	0.3	0.4	0.4	2.4	1.0
Agriculture, hunting & related activities (SIC01)	4.7	4.7	3.7	0.5	0.5	0.4	0.0	-1.7
Growing of crops (SIC011)	0.8	1.1	0.9	0.1	0.1	0.1	4.5	-1.4
Growing of cereals (SIC0111)	0.3	0.4	0.3	0.0	0.0	0.0	4.7	-2.1
Growing of vegetables (SIC0112)	0.5	0.7	0.6	0.1	0.1	0.1	4.3	-1.0
Growing of fruits, nuts & spices (SIC0113)	0.0	0.0	0.0	0.0	0.0	0.0	#DIV/0!	#DIV/0!
Farming of animals (SIC012)	1.2	1.1	0.9	0.1	0.1	0.1	-1.3	-1.7
Farming of cattle (SIC0121)	0.2	0.2	0.2	0.0	0.0	0.0	2.4	-2.1
Farming of sheep, goats etc. (SIC0122)	0.1	0.1	0.1	0.0	0.0	0.0	0.0	-1.7
Farming of swine (SIC0123)	0.0	0.0	0.0	0.0	0.0	0.0	2.8	-1.7
Farming of poultry (SIC0124)	0.9	0.7	0.6	0.1	0.1	0.1	-3.3	-1.6

Employees in employment-disaggregated categories	1995 (000s)	2002 (000s)	2015 (000s)	Share of economy			Annual Average Growth	
				1995	2002	2015	1995-02	2002-15
				(per cent)	(per cent)	(per cent)	(per cent)	(per cent)
Other farming of animals (SIC0125)	0.1	0.1	0.1	0.0	0.0	0.0	7.1	-1.9
Growing of crops combined with farming of animals (SIC013)	0.3	0.2	0.2	0.0	0.0	0.0	-1.3	-2.4
Agricultural & animal husbandry service activities, except veterinary (SIC014)	2.3	2.1	1.7	0.3	0.2	0.2	-1.1	-1.8
Hunting, gaming & game propagation (SIC015)	0.0	0.1	0.1	0.0	0.0	0.0	5.0	-0.4
Forestry, logging & related activities (SIC02)	2.0	2.8	2.3	0.2	0.3	0.2	4.5	-1.3
Fishing (SIC05)	0.8	0.9	0.8	0.1	0.1	0.1	3.0	-1.7
Fishing (SIC0501)	0.7	0.9	0.7	0.1	0.1	0.1	3.4	-1.6
Operation of fish hatcheries & fish farms (SIC0502)	0.0	0.0	0.0	0.0	0.0	0.0	-5.6	-4.7
Production, processing and preserving of meat (SIC151)	1.9	2.9	3.2	0.2	0.3	0.3	5.9	0.8
Processing and preserving of fish (SIC152)	0.5	0.6	0.7	0.1	0.1	0.1	4.4	0.6
Manufacture of dairy products (SIC155)	0.6	1.0	1.0	0.1	0.1	0.1	7.3	0.3
Manufacture of beverage products (SIC159)	1.6	1.7	1.5	0.2	0.2	0.2	1.0	-1.1
Production of mineral waters and soft drinks (SIC1598)	0.7	0.6	0.5	0.1	0.1	0.0	-1.3	-2.4
Manufacture of rubber products (SIC251)	1.7	2.0	2.1	0.2	0.2	0.2	2.6	0.2
Manufacture of cement, lime and plaster (SIC265)	0.2	0.1	0.1	0.0	0.0	0.0	-8.8	-2.3
Manufacture of articles of concrete, plaster and cement (SIC266)	1.1	0.6	0.2	0.1	0.1	0.0	-8.3	-6.9
Manufacture of basic iron and steel and ferro-alloys (SIC271)	6.9	5.0	5.1	0.7	0.5	0.5	-4.6	0.2
Manufacture of basic precious and non-ferrous metals (SIC274)	1.1	1.1	0.9	0.1	0.1	0.1	0.6	-1.3
Manufacture of parts and accessories for motor vehicles and engines (SIC343)	5.5	7.2	6.1	0.6	0.8	0.6	3.9	-1.3
Manufacture of aircraft and spacecraft (SIC353)	0.6	1.7	1.4	0.1	0.2	0.2	16.3	-1.4
Camping sites and other provision of short-stay accommodation (SIC552)	0.5	0.7	0.8	0.1	0.1	0.1	3.5	1.7
Sporting activities (SIC926)	11.2	11.1	12.7	1.2	1.2	1.3	-0.2	1.1
Manufacture of industrial gases (SIC2411)	0.7	0.4	0.2	0.1	0.0	0.0	-6.5	-4.6
Manufacture of dyes and pigments (SIC2412)	1.4	0.6	0.4	0.1	0.1	0.0	-11.1	-3.6
Manufacture of other inorganic basic chemicals (SIC2413)	0.1	0.1	0.0	0.0	0.0	0.0	4.5	-4.6

Employees in employment-disaggregated categories	1995 (000s)	2002 (000s)	2015 (000s)	Share of economy			Annual Average Growth	
				1995 (per cent)	2002 (per cent)	2015 (per cent)	1995-02 (per cent)	2002-15 (per cent)
Manufacture of other organic basic chemicals (SIC2414)	3.7	3.3	2.2	0.4	0.3	0.2	-1.6	-3.1
Manufacture of fertilizers and nitrogen compounds (SIC2415)	0.4	0.3	0.2	0.0	0.0	0.0	-3.6	-3.9
Manufacture of plastics in primary forms (SIC2416)	2.6	2.0	1.6	0.3	0.2	0.2	-3.6	-1.9
Manufacture of synthetic rubber in primary forms (SIC2417)	0.2	0.1	0.0	0.0	0.0	0.0	-14.6	-3.6
Casting of light metals (SIC2753)	0.2	0.2	0.2	0.0	0.0	0.0		
Casting of other non-ferrous metals (SIC2754)	0.1	0.1	0.1	0.0	0.0	0.0	-4.2	0.4
Sea and coastal water transport (SIC6110)	0.2	0.2	0.2	0.0	0.0	0.0	-0.4	-1.2
Inland water transport (SIC6120)	0.0	0.0	0.0	0.0	0.0	0.0	10.6	1.2
Washing and dry cleaning of textile and fur products (SIC9301)	0.9	0.8	0.9	0.1	0.1	0.1	-1.8	0.7
Construction of water projects (SIC4524)	0.2	0.2	0.3	0.0	0.0	0.0	4.2	0.6

Output (£million, 2000 prices)	1995	2002	2015	Share of economy			Annual average growth	
				1995 (per cent)	2002 (per cent)	2015 (per cent)	1995-02 (per cent)	2002-15 (per cent)
Standard 30 categories	(£m)	(£m)	(£m)					
Agriculture, forestry & fishing	186.2	257.3	269.8	0.8	1.0	0.8	4.7	0.4
Oil & gas extraction	56.0	78.4	86.5	0.2	0.3	0.3	4.9	0.8
Other mining	204.6	163.4	123.2	0.8	0.6	0.4	-3.2	-2.2
Gas, electricity & water	546.1	671.0	836.1	2.2	2.6	2.5	3.0	1.7
Fuel refining	80.9	13.4	103.2	0.3	0.1	0.3	-22.7	17.0
Chemicals	1031.0	978.0	1241.1	4.2	3.7	3.7	-0.8	1.8
Minerals	198.3	105.5	65.1	0.8	0.4	0.2	-8.6	-3.6
Metals	995.3	777.2	733.9	4.1	3.0	2.2	-3.5	-0.4
Machinery & equipment	699.1	540.5	352.5	2.9	2.1	1.1	-3.6	-3.2
Electrical & optical equipment	588.0	541.5	997.1	2.4	2.1	3.0	-1.2	4.8
Transport equipment	586.4	777.4	1065.7	2.4	3.0	3.2	4.1	2.5
Food, drink & tobacco	784.9	834.7	995.2	3.2	3.2	3.0	0.9	1.4
Textiles & clothing	327.0	97.0	43.4	1.3	0.4	0.1	-15.9	-6.0
Wood & wood products	172.3	165.3	221.2	0.7	0.6	0.7	-0.6	2.3
Paper, printing & publishing	597.5	394.2	324.1	2.5	1.5	1.0	-5.8	-1.5
Rubber & plastics	374.5	353.8	452.7	1.5	1.4	1.4	-0.8	1.9
Other manufacturing	292.7	264.4	297.0	1.2	1.0	0.9	-1.4	0.9
Construction	1587.5	1766.6	2515.7	6.5	6.8	7.5	1.5	2.8
Retailing	1245.8	1677.8	2502.2	5.1	6.4	7.5	4.3	3.1
Wholesale & distribution	1463.8	1499.6	1342.0	6.0	5.7	4.0	0.3	-0.9
Hotels & catering	754.0	971.4	1383.3	3.1	3.7	4.1	3.7	2.8
Transport	1244.7	1233.3	1372.9	5.1	4.7	4.1	-0.1	0.8
Communications	365.9	876.1	2070.1	1.5	3.4	6.2	13.3	6.8
Banking & insurance	637.6	823.6	925.7	2.6	3.2	2.8	3.7	0.9
Business services	1699.1	2346.8	3579.1	7.0	9.0	10.7	4.7	3.3
Other financial & business services	550.6	667.7	714.8	2.3	2.6	2.1	2.8	0.5
Public administration & defence	1749.5	1757.1	1530.8	7.2	6.7	4.6	0.1	-1.1
Education	2105.6	1951.0	2952.2	8.7	7.5	8.8	-1.1	3.2
Health	1996.0	2559.6	2991.1	8.2	9.8	9.0	3.6	1.2
Other services	1163.1	984.7	1326.5	4.8	3.8	4.0	-2.4	2.3
<b>Total Output</b>	<b>24283.9</b>	<b>26128.4</b>	<b>33414.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>1.1</b>	<b>1.9</b>

Output- disaggregated categories (£million, 2000 prices)	1995	2002	2015	Share of economy			Annual average growth	
				1995	2002	2015	1995-02	2002-15
				(per cent)	(per cent)	(per cent)	(per cent)	(per cent)
	(£m)	(£m)	(£m)					
Electricity, gas, steam & hot water supply (SIC40)	446.7	530.2	649.6	1.8	2.0	1.9	2.5	1.6
Production & distribution of electricity (SIC40.1)	312.1	420.1	521.6	1.3	1.6	1.6	4.3	1.7
Manufacture of gas (SIC40.2)	134.6	110.1	128.1	0.6	0.4	0.4	-2.8	1.2
Steam & hot water supply (SIC40.3)	0.0	0.0	0.0	0.0	0.0	0.0	#DIV/0!	#DIV/0!
Collection, purification & distribution of water (SIC41)	99.4	140.7	186.5	0.4	0.5	0.6	5.1	2.2
Manufacture of basic chemicals (SIC24.1)	527.0	484.2	519.9	2.2	1.9	1.6	-1.2	0.5
Manufacture of pesticides & other agro-chemicals (SIC24.2)	2.6	2.4	2.0	0.0	0.0	0.0	-1.0	-1.3
Manufacture of paints & varnishes etc. (SIC24.3)	115.9	119.3	176.2	0.5	0.5	0.5	0.4	3.0
Manufacture of pharmaceuticals (SIC24.4)	198.9	191.5	302.7	0.8	0.7	0.9	-0.5	3.6
Manufacture of soaps & detergents (SIC24.5)	78.9	87.1	104.7	0.3	0.3	0.3	1.4	1.4
Manufacture of other chemical products (SIC24.6)	99.6	89.9	128.2	0.4	0.3	0.4	-1.5	2.8
Manufacture of man made fibres (SIC24.7)	8.2	3.6	7.4	0.0	0.0	0.0	-11.1	5.7
Manufacture of basic metals (SIC27)	332.5	267.5	269.5	1.4	1.0	0.8	-3.1	0.1
Manufacture of pulp, paper & paper products (SIC21)	224.5	127.1	98.9	0.9	0.5	0.3	-7.8	-1.9
Mining of coal & lignite (SIC10)	91.3	54.1	45.6	0.4	0.2	0.1	-7.2	-1.3
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	#DIV/0!	#DIV/0!
Other mining (SIC14)	113.3	109.3	77.6	0.5	0.4	0.2	-0.5	-2.6
Sewage & refuse disposal (SIC90)	97.8	102.8	139.1	0.4	0.4	0.4	0.7	2.3
Agriculture, hunting & related activities (SIC01)	116.7	149.7	157.2	0.5	0.6	0.5	3.6	0.4
Growing of crops (SIC011)	20.3	31.6	33.7	0.1	0.1	0.1	6.6	0.5
Growing of cereals (SIC0111)	5.5	10.5	9.6	0.0	0.0	0.0	9.5	-0.6
Growing of vegetables (SIC0112)	14.7	21.2	24.0	0.1	0.1	0.1	5.3	1.0
Growing of fruits, nuts & spices (SIC0113)	0.0	0.0	0.0	0.0	0.0	0.0	#DIV/0!	#DIV/0!
Farming of animals (SIC012)	41.2	48.6	49.2	0.2	0.2	0.1	2.4	0.1
Farming of cattle (SIC0121)	5.7	7.5	7.7	0.0	0.0	0.0	4.1	0.2
Farming of sheep, goats etc. (SIC0122)	1.9	2.4	2.3	0.0	0.0	0.0	3.5	-0.5
Farming of swine (SIC0123)	0.4	0.6	0.5	0.0	0.0	0.0	7.1	-1.0
Farming of poultry (SIC0124)	31.4	35.9	36.7	0.1	0.1	0.1	1.9	0.2

Output- disaggregated categories (£million, 2000 prices)	1995	2002	2015	Share of economy			Annual average growth	
				1995	2002	2015	1995-02	2002-15
				(per cent)	(per cent)	(per cent)	(per cent)	(per cent)
	(£m)	(£m)	(£m)	(per cent)	(per cent)	(per cent)	(per cent)	(per cent)
Other farming of animals (SIC0125)	1.8	2.1	2.0	0.0	0.0	0.0	2.0	-0.4
Growing of crops combined with farming of animals (SIC013)	7.4	9.4	8.6	0.0	0.0	0.0	3.6	-0.7
Agricultural & animal husbandry service activities, except veterinary (SIC014)	46.7	58.2	63.8	0.2	0.2	0.2	3.2	0.7
Hunting, gaming & game propagation (SIC015)	1.1	1.9	1.9	0.0	0.0	0.0	7.5	0.2
Forestry, logging & related activities (SIC02)	47.3	80.4	82.7	0.2	0.3	0.2	7.9	0.2
Fishing (SIC05)	22.2	27.2	29.9	0.1	0.1	0.1	2.9	0.7
Fishing (SIC0501)	21.3	26.2	28.9	0.1	0.1	0.1	3.0	0.8
Operation of fish hatcheries & fish farms (SIC0502)	0.9	1.0	0.9	0.0	0.0	0.0	1.3	-0.7
Production, processing and preserving of meat (SIC151)	108.2	143.8	189.7	0.4	0.6	0.6	4.1	2.2
Processing and preserving of fish (SIC152)	27.9	33.2	43.3	0.1	0.1	0.1	2.5	2.1
Manufacture of dairy products (SIC155)	32.7	49.4	62.2	0.1	0.2	0.2	6.1	1.8
Manufacture of beverage products (SIC159)	93.5	87.1	90.2	0.4	0.3	0.3	-1.0	0.3
Production of mineral waters and soft drinks (SIC1598)	39.9	31.3	27.1	0.2	0.1	0.1	-3.4	-1.1
Manufacture of rubber products (SIC251)	53.9	54.9	79.2	0.2	0.2	0.2	0.3	2.9
Manufacture of cement, lime and plaster (SIC265)	6.8	3.6	3.1	0.0	0.0	0.0	-8.7	-1.1
Manufacture of articles of concrete, plaster and cement (SIC266)	36.3	19.1	8.9	0.1	0.1	0.0	-8.8	-5.7
Manufacture of basic iron and steel and ferro-alloys (SIC271)	205.4	159.1	167.6	0.8	0.6	0.5	-3.6	0.4
Manufacture of basic precious and non-ferrous metals (SIC274)	33.2	36.3	32.4	0.1	0.1	0.1	1.3	-0.9
Manufacture of parts and accessories for motor vehicles and engines (SIC343)	231.5	290.6	378.2	1.0	1.1	1.1	3.3	2.0
Manufacture of aircraft and spacecraft (SIC353)	25.3	67.6	86.2	0.1	0.3	0.3	15.1	1.9
Camping sites and other provision of short-stay accommodation (SIC552)	7.9	10.6	15.8	0.0	0.0	0.0	4.2	3.1
Sporting activities (SIC926)	242.5	215.0	293.0	1.0	0.8	0.9	-1.7	2.4
Manufacture of industrial gases (SIC2411)	40.7	31.5	27.0	0.2	0.1	0.1	-3.6	-1.2
Manufacture of dyes and pigments (SIC2412)	78.6	42.2	41.3	0.3	0.2	0.1	-8.5	-0.2
Manufacture of other inorganic basic chemicals (SIC2413)	3.2	5.2	4.5	0.0	0.0	0.0	7.5	-1.2

Output- disaggregated categories (£million, 2000 prices)	1995	2002	2015	Share of economy			Annual average growth	
				1995	2002	2015	1995-02	2002-15
				(per cent)	(per cent)	(per cent)	(per cent)	(per cent)
	(£m)	(£m)	(£m)					
Manufacture of other organic basic chemicals (SIC2414)	212.1	231.1	241.2	0.9	0.9	0.7	1.2	0.3
Manufacture of fertilizers and nitrogen compounds (SIC2415)	23.1	21.9	20.4	0.1	0.1	0.1	-0.7	-0.5
Manufacture of plastics in primary forms (SIC2416)	155.1	146.5	180.0	0.6	0.6	0.5	-0.8	1.6
Manufacture of synthetic rubber in primary forms (SIC2417)	14.0	5.7	5.5	0.1	0.0	0.0	-12.1	-0.2
Casting of light metals (SIC2753)	5.3	6.1	6.6	0.0	0.0	0.0	2.1	0.5
Casting of other non-ferrous metals (SIC2754)	2.9	2.3	2.4	0.0	0.0	0.0	-3.5	0.4
Sea and coastal water transport (SIC6110)	6.8	6.9	7.6	0.0	0.0	0.0	0.0	0.8
Inland water transport (SIC6120)	0.6	1.0	1.4	0.0	0.0	0.0	7.0	2.9
Washing and dry cleaning of textile and fur products (SIC9301)	23.1	19.1	25.2	0.1	0.1	0.1	-2.6	2.2
Construction of water projects (SIC4524)	5.8	6.8	9.5	0.0	0.0	0.0	2.3	2.6