

2002 - 2003 WATER RESOURCES SURVEY

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Foreword

In Scottish Water's first year of operation the foundations were laid to begin to transform the water industry. The current report represents the water resource position for this first year of Scottish Water. Prior to the formation of Scottish Water, the Annual Water Resource Survey for Scotland was for many years produced by the Water Services Unit of the Scottish Executive (and formerly Scottish Office).

Water resources are a key part of our business, and steps have been taken during 2002-03 to build on the work done by our predecessor authorities. A fundamental part of this work is to build an understanding of the reliability of our resources both under current demand and future demand scenarios.

Scottish Water has continued to develop yield estimates using the best available techniques specifically designed for use in Scotland. Our understanding of system demands is gradually being built up from improved knowledge of the individual components of demand and systematic work to address the areas of uncertainty.

This improved understanding will enable us to target spending efficiently at areas that will give the best return for our customers. Already, the current investment programme is starting to address our network of 46,000 kilometres of water mains. A key future project is the leakage strategy which is critical to the efficient use of assets and minimising wastage.

Scottish Water is responsible for maintaining sufficient supplies of water for customers across Scotland and for ensuring appropriate action is taken to manage the changing situation in the event of a drought. A well rehearsed strategy is in place for managing a severe reduction in water supplies, statutory requirements and communication with customers.

Commentary

Survey Data

The Water Resources Survey Data in this report relate to the twelve-month period 1 April 2002 to 31 March 2003 and any reference to the single year 2002 means the period 2002/2003.

Demand Figures

Throughout this report figures are given as demand figures. Demand is the total volume of water put into the supply to satisfy the requirements of consumers. It also includes leakage and any other waste, which may be incurred. The two main elements of water demand are metered and unmetered supplies. Metered demand represents the volume of potable water supplied to industry and is charged for on the basis of measured quantity. Industry also uses a small quantity of non-potable water and this is indicated separately where appropriate. The unmetered element of demand includes domestic supplies, small unmetered industrial supplies, water used for operational purposes, public supplies (fire fighting, sewer flushing, etc.) unmetered standpipes used for temporary supplies and field troughs in rural areas. Unmetered demand also includes leakage from the distribution system and consumers' supply pipes in addition to wastage associated with any of the above activities or from the burst pipes.

Per Capita Demand

The connected population for 2002 was 4,863,000. This means that, for the total quantity of water used for public water supplies in Scotland, per capita demand has risen from 462 l/h/d in 2001 to 490.8 l/h/d in 2002. This increase is due to the increase in unmetered demand and the reduction in the connected population.

Unmetered Demand

There has been an increase in unmetered demand from 1,876 MI/d in 2001 to 1,934 MI/d in 2002. The reason for this is unclear but may be partially due to a consistent methodology being adopted by Scottish Water rather than the three slightly differing methodologies used by the former authorities.

Metered Demand

There has been a decrease in metered demand from 523 MI/d in 2001 to 444 MI/d in 2002. This is due to a reduction in the number of metered customers caused through more accurate data from the WIC22 reporting process, which details expected revenue from non-domestic customers on a bi-annual basis.

Total Daily Demand

Total daily demand is the summation of unmetered and metered demand plus a small amount of non-potable use. There has been a small decrease in total demand from 2,408 MI/d in 2001 to 2,387 MI/d in 2002.

Yield Assessment

The confidence in the accuracy of the historic estimates of yield from Scottish Water's surface water resources has improved. This is due to the ongoing reassessment of yields using industry best practice software (Hysim – Aquator) where applicable. This methodology was developed under a joint research and development project involving the three former Scottish water authorities and SNIFFER (Scotland and Northern Ireland Forum For Environmental Research).

The Hysim model simulates the rainfall – runoff process on a catchment. Aquator models the interconnection of the physical assets, such as reservoirs, intakes, pumping stations etc as well as modelling the operating rules. The output from Hysim / Aquator provides a modern assessment of yield linking return period to the corresponding yield. The figures quoted are deployable yields, which take account of any infrastructure restrictions and compensation requirements.

For other sources, empirical methods such as the Institute of Hydrology – Low Flows Methodology or equivalent have been used. Ongoing discussions with SEPA will formalise the appropriate methodology. This will result in greater confidence in yield assessments but will also highlight the need for additional investment.

Comparison of actual demand with forecast demand

The 1994 Assessment of Demands and Resources gave principal, upper and lower projections of the total water demand for Scotland from 1991 to 2017. Figure 10, on page 19 compares actual demand for the years 1991 to 2002 with projected demand from the 1994 report. It appears from the reported data to date that the trend in total water demand is presently following the upper projection. The upper projection assumed an increase in domestic demand of 1.5 l/h/d/year from 1991 and no progress in reducing leakage. For metered non-household demand, the upper projection assumed an industrial efficiency gain of 1% per annum and relative price of metered water increasing at the same rate as in the past (using the economic approach to forecast industrial demand).

Key Facts

The following Key Facts table summarises the demands and resources position for Scotland for 2002/2003 and also illustrates how the position has changed since the previous survey of 2001/2002.

| Increase / Decrease Total for Scotland | 2002/2003 | 2001/2002 | (+) | (-) |
|---|-------------------|-----------|------|--------|
| Average Daily Demand (MI/d) | 2,387 | 2,409 | | -0.9% |
| Unmetered (MI/d) | 1,934 | 1,876 | 3.1% | |
| Metered + Non-Potable (MI/d) | 452 | 532 | | -15.0% |
| Developed Resources (MI/d) | 3,564 | 3,564 | 0 | |
| Demand / Yield Ratio | 0.67 ¹ | 0.68 | | -0.9% |

Notes: 1. The national demand-yield ratio is an average figure. It should be noted that there are localised areas where the demand-yield ratio is greater than 1, and hence demand exceeds the available yield.

The Surface Waters (Abstraction for Drinking Water) (Classification) (Scotland) Regulations 1996

In implementation of directive 75/440/EEC (quality required of surface water intended for the abstraction of drinking water), these Regulations prescribe a system for classifying the quality of inland waters according to their suitability for abstraction for supply as drinking water. They provide mandatory values for the classifications DW1, DW2 and DW3 in Schedule 1 to the regulations and guideline values for those classifications in Schedule 2 to the Regulations. The source classification below gives the total number of sources classified in accordance with the Regulations, DW1 being better quality water than DW2.

| Number of Sources | DW1 | DW2 | DW3 |
|--------------------|-----|-----|-----|
| Total for Scotland | 117 | 143 | 95 |

Leakage

The following is a brief summary of Scottish Water's current position on leakage and its policy on leakage control.

Scottish Water's leakage level in 2002 was 1132 MI/d, which equates to 47 % of the total MI/d supplied.

Scottish Water is committed to a cost effective, robust and achievable leakage policy, taking action where necessary to:

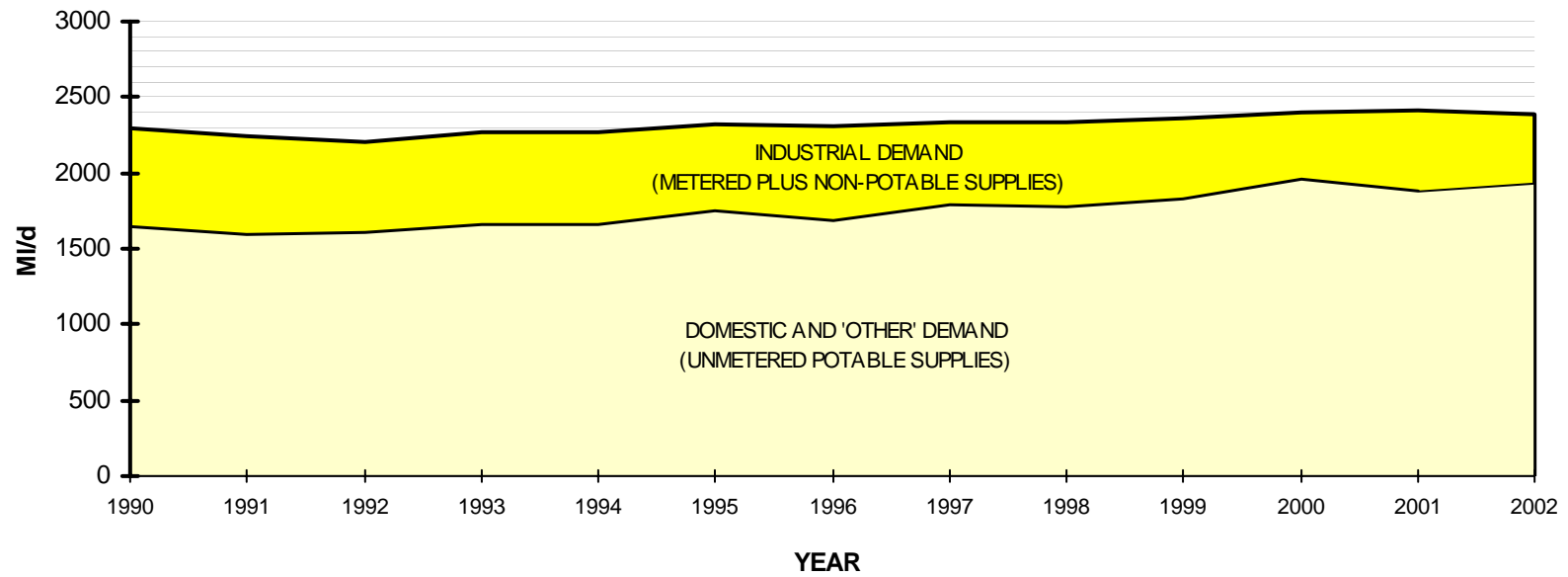
Reduce the uncertainty attached to the understanding of the current level of leakage and natural rate of rise of leakage.

- Quantify the impact of leakage upon operational costs, particularly in critical supply chains;
- Improve the understanding of the environmental and social impact of leakage and the environmental costs and benefits of leakage management.
- Improve the reliability of asset information to produce more robust estimates of short and long-term economic levels of leakage (as defined in further section);
- Benchmark performance against English and Welsh companies
- Engage in active leakage control and pressure management where it is needed in order to comply with regulatory standards (abstraction limits) or levels of service targets (e.g. pressure) and/or where it is proven to achieve operational or capital efficiencies in each geographical area.

| WATER: PUBLIC SUPPLIES AVERAGE DAILY DEMAND 2002/2003 | | | | | TABLE A |
|---|-------------------------------|-----------------------------|----------------------|--------------------|------------------------|
| Total, Potable (unmetered & metered) and Non-potable supply (MI/d) | | | | | |
| Year | Total Daily Demand (1) | Total Potable Demand | Potable | | Non-Potable (4) |
| | | | Unmetered (2) | Metered (3) | |
| 1990 | 2,301 | 2,281 | 1,645 | 636 | 19 |
| 1991 | 2,239 | 2,222 | 1,596 | 626 | 17 |
| 1992 | 2,206 | 2,188 | 1,603 | 585 | 18 |
| 1993 | 2,272 | 2,258 | 1,662 | 596 | 14 |
| 1994 | 2,263 | 2,246 | 1,651 | 595 | 17 |
| 1995 | 2,322 | 2,306 | 1,748 | 558 | 16 |
| 1996 | 2,312 | 2,255 | 1,686 | 568 | 57 |
| 1997 | 2,336 | 2,320 | 1,782 | 539 | 16 |
| 1998 | 2,329 | 2,317 | 1,775 | 541 | 12 |
| 1999 | 2,363 | 2,353 | 1,832 | 520 | 11 |
| 2000 | 2,400 | 2,390 | 1,962 | 427 | 11 |
| 2001 | 2,409 | 2,399 | 1,876 | 523 | 10 |
| | | | | | |
| 2002 Total | 2,387 | 2,378 | 1,934 | 444 | 9 |
| NOTES: (1) Total quantity put into supply to satisfy consumers plus leakage and other waste | | | | | |
| (2) Household, non-household/non-metered (small commercial supplies, operational use, fire fighting, sewer cleaning, temporary supplies for construction sites etc.) and leakage. | | | | | |
| (3) Industry and commerce charged for on measured quantity. | | | | | |
| (4) Non-potable water is used by some industries. | | | | | |
| Source: Scottish Water | | | | | |

**AVERAGE DAILY DEMAND
(1990-2002)**

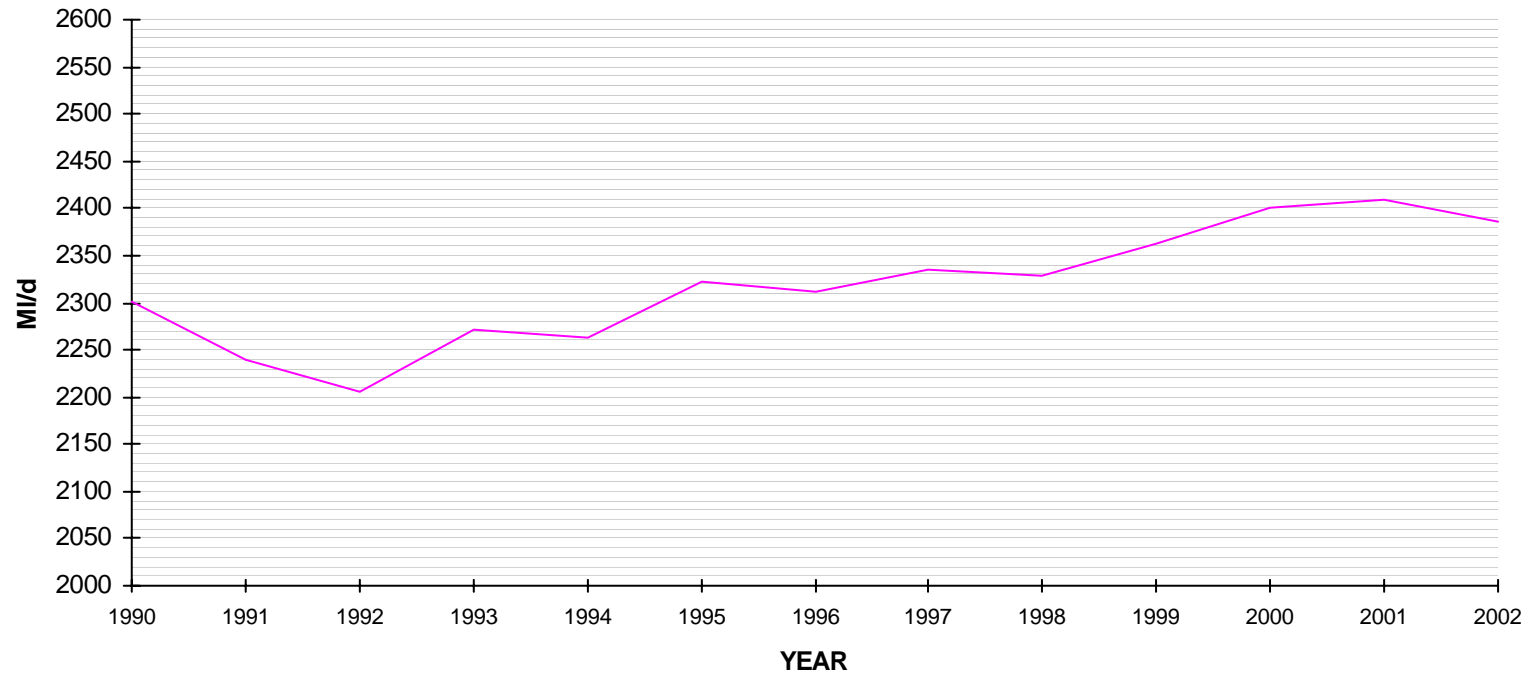
Figure 1



Source: Scottish Water

TOTAL DEMAND 1990-2002

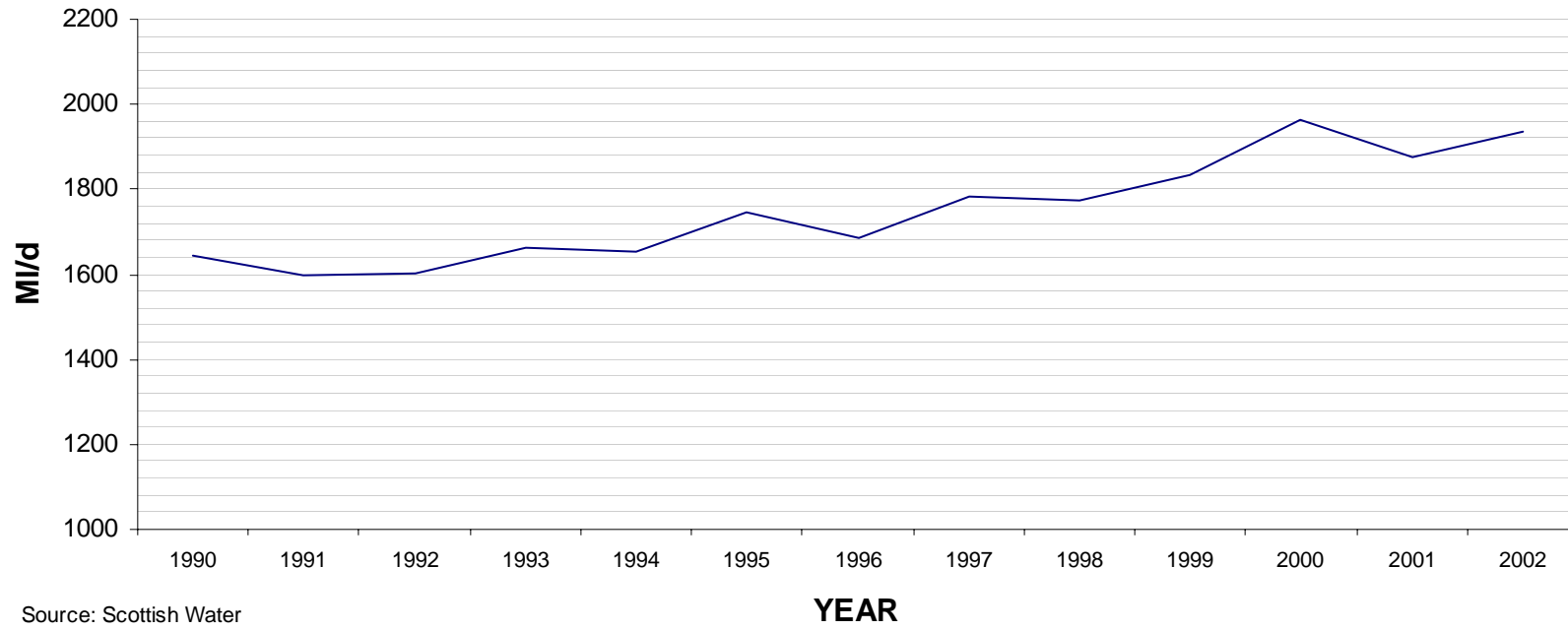
Figure 2



Source: Scottish Water

UNMETERED POTABLE DEMAND 1990-2002

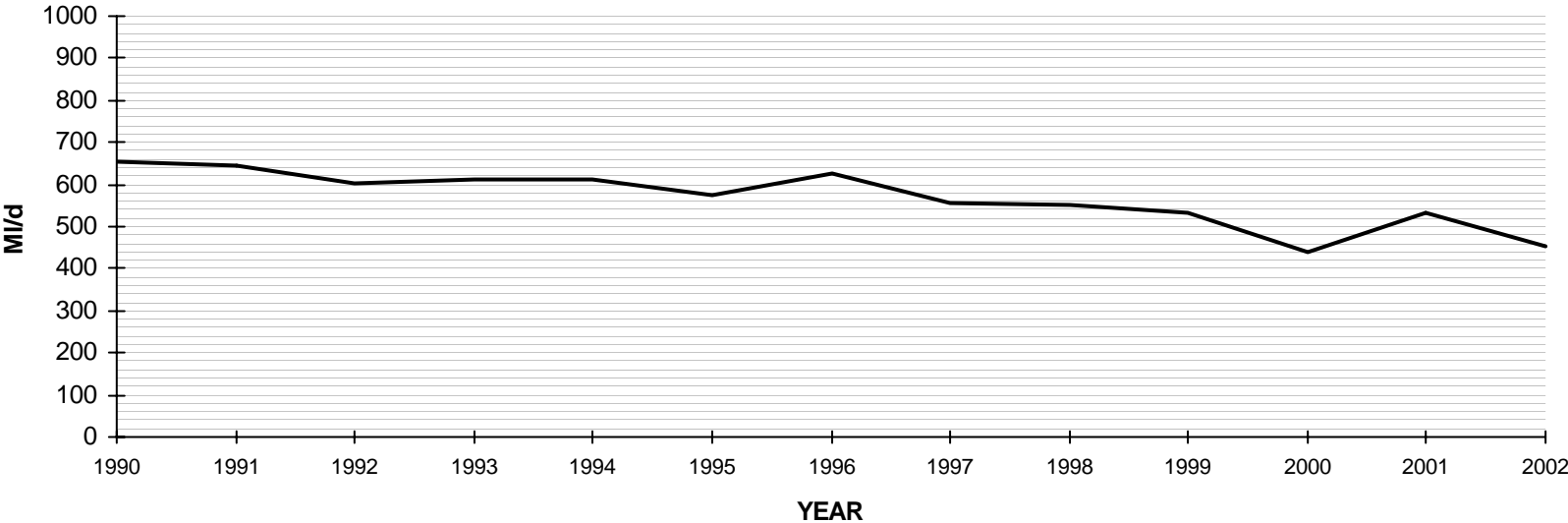
Figure 3



Source: Scottish Water

**INDUSTRIAL DEMAND 1990-2002
METERED + NON-POTABLE SUPPLIES**

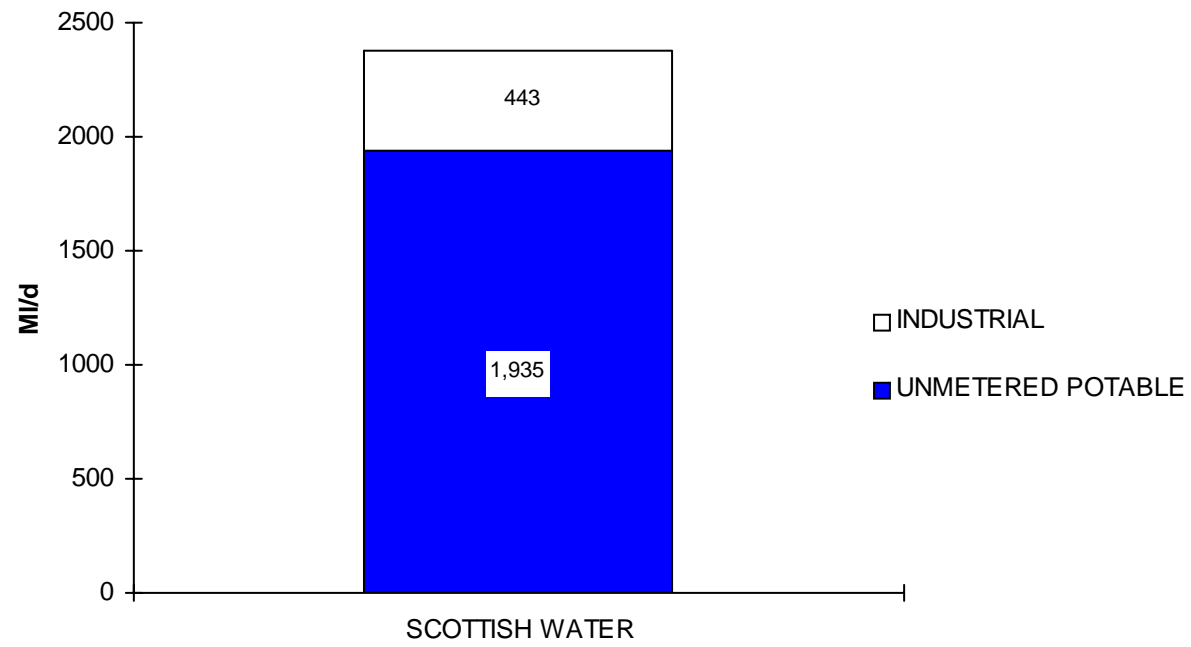
Figure 4



Source: Scottish Water

**AVERAGE DAILY DEMAND 2002/2003
(INDUSTRIAL + UNMETERED POTABLE SUPPLIES)**

Figure 5



Source: Scottish Water

WATER: PER CAPITA DAILY DEMAND 2002/2003

TABLE B

| Year | Total Population (x1000) | Unit Demand (l/h/d) | | | Demand % | |
|-------------------|--------------------------------|---------------------|----------------|-------------------------------|----------------|-------------------------------|
| | | Total | Un- Metered | Metered and Non Potable | Un- Metered | Metered And Non Potable |
| 1990 | 5,102 | 451 | 322 | 129 | 71 | 29 |
| 1991 | 5,100 | 439 | 313 | 126 | 71 | 29 |
| 1992 | 5,107 | 432 | 314 | 118 | 73 | 27 |
| 1993 | 5,120 | 444 | 325 | 119 | 73 | 27 |
| 1994 | 5,132 | 441 | 322 | 119 | 73 | 27 |
| 1995 | 5,137 | 452 | 340 | 112 | 75 | 25 |
| 1996 | 4,996 ⁽¹⁾ | 463 | 338 | 117 | 74 | 26 |
| 1997 | 4,986 | 469 | 357 | 110 | 77 | 24 |
| 1998 | 5,005 | 465 | 383 | 82 | 82 | 18 |
| 1999 | 4,981 | 474 | 384 | 106 | 78 | 22 |
| 2000 | 5,013 | 479 | 392 | 87 | 82 | 18 |
| 2001 | 5215 | 462 | 360 | 102 | 78 | 22 |
| 2002 TOTAL | 4,863 | 490.8 | 397.8 | 93.0 | 81.0 | 19.0 |

NOTES: (1) Connected Population from 1996

Source: Scottish Water

| WATER: DEVELOPED RESOURCES IN SCOTLAND 2002/2003 | | | | | | | | | | | | TABLE C |
|--|--------------|------------|-----------|---------------|------------|---------------------|-----------|-----------|-----------|----------------------|------------|--------------------|
| Number and Yield(Ml/d) of Sources in each category | | | | | | | | | | | | |
| Year | Reservoirs | | | River Intakes | | Underground Sources | | | | Total Supply Sources | | Tot incl Comp Res. |
| | All | Res/Lochs | Feed Int | | | Boreholes | Springs | | Yield | No | | |
| | Yield | No | No | Yield | No | Yield | No | Yield | No | Yield | No | No |
| 1990 | 2,971 | 357 | 30 | 403 | 246 | 55 | 51 | 57 | 160 | 3,486 | 844 | 862 |
| 1991 | 2,982 | 353 | 30 | 402 | 242 | 55 | 52 | 56 | 153 | 3,495 | 830 | 850 |
| 1992 | 3,028 | 330 | 29 | 427 | 237 | 51 | 35 | 54 | 131 | 3,560 | 762 | 780 |
| 1993 | 3,015 | 316 | 27 | 428 | 243 | 50 | 35 | 56 | 129 | 3,547 | 750 | 768 |
| 1994 | 3,019 | 312 | 26 | 425 | 236 | 52 | 36 | 54 | 122 | 3,550 | 732 | 750 |
| 1995 | 2,990 | 308 | 26 | 424 | 233 | 55 | 37 | 32 | 106 | 3,501 | 710 | 728 |
| 1996 | 2,943 | 287 | 23 | 452 | 249 | 100 | 45 | 27 | 84 | 3,487 | 675 | 692 |
| 1997 | 3,018 | 288 | 27 | 422 | 223 | 77 | 35 | 46 | 103 | 3,562 | 676 | 693 |
| 1998 | 3,099 | 321 | 23 | 452 | 247 | 81 | 41 | 27 | 85 | 3,660 | 717 | 732 |
| 1999 | 3,099 | 322 | 23 | 452 | 249 | 100 | 45 | 27 | 84 | 3,678 | 723 | 738 |
| 2000 | 3,077 | 315 | 22 | 357 | 245 | 101 | 45 | 30 | 79 | 3,564 | 706 | 724 |
| 2001 | 3,077 | 333 | 47 | 357 | 265 | 101 | 46 | 26 | 76 | 3,564 | 767 | 785 |
| 2002 Total | 3,077 | 333 | 47 | 357 | 265 | 103 | 46 | 26 | 76 | 3,563 | 767 | 785 |

Note: a) Column 2 gives yield from Reservoirs, Lochs, Feeder Intakes and Regulating Reservoirs. The yield recorded for a large number of sources is the abstraction limit prescribed in the relevant Water Order. In many cases the available yield will be different from the legal limit.

b) Column 3 is a count of Reservoirs, Lochs and Regulating Reservoirs (Feeder Intakes are counted in Column 4)

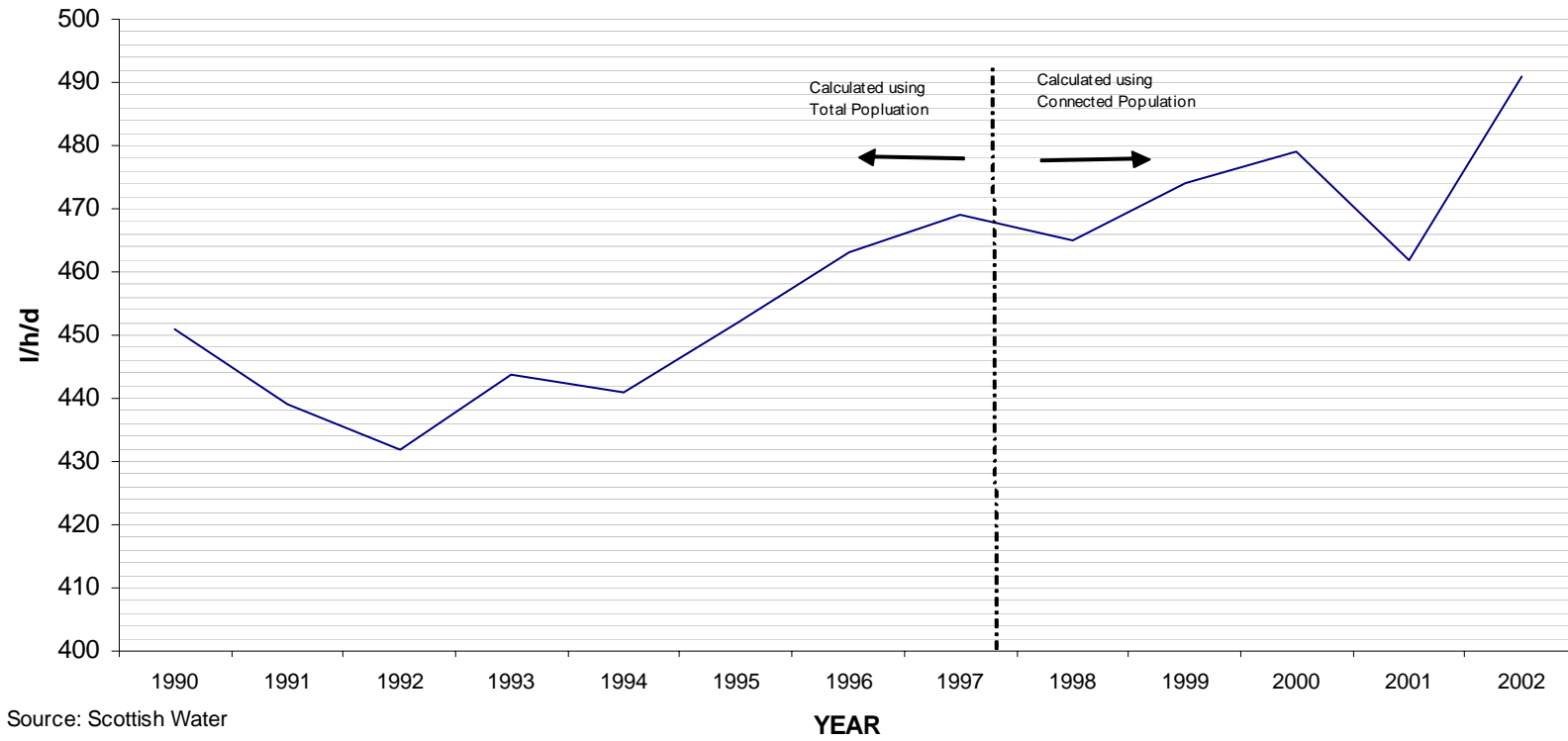
c) Compensation Reservoirs are excluded except in the extreme right-hand column where they are included in the count.

d) Pre 1992 the number of sources recorded include multiple sources at a single location.

Source: Scottish Water

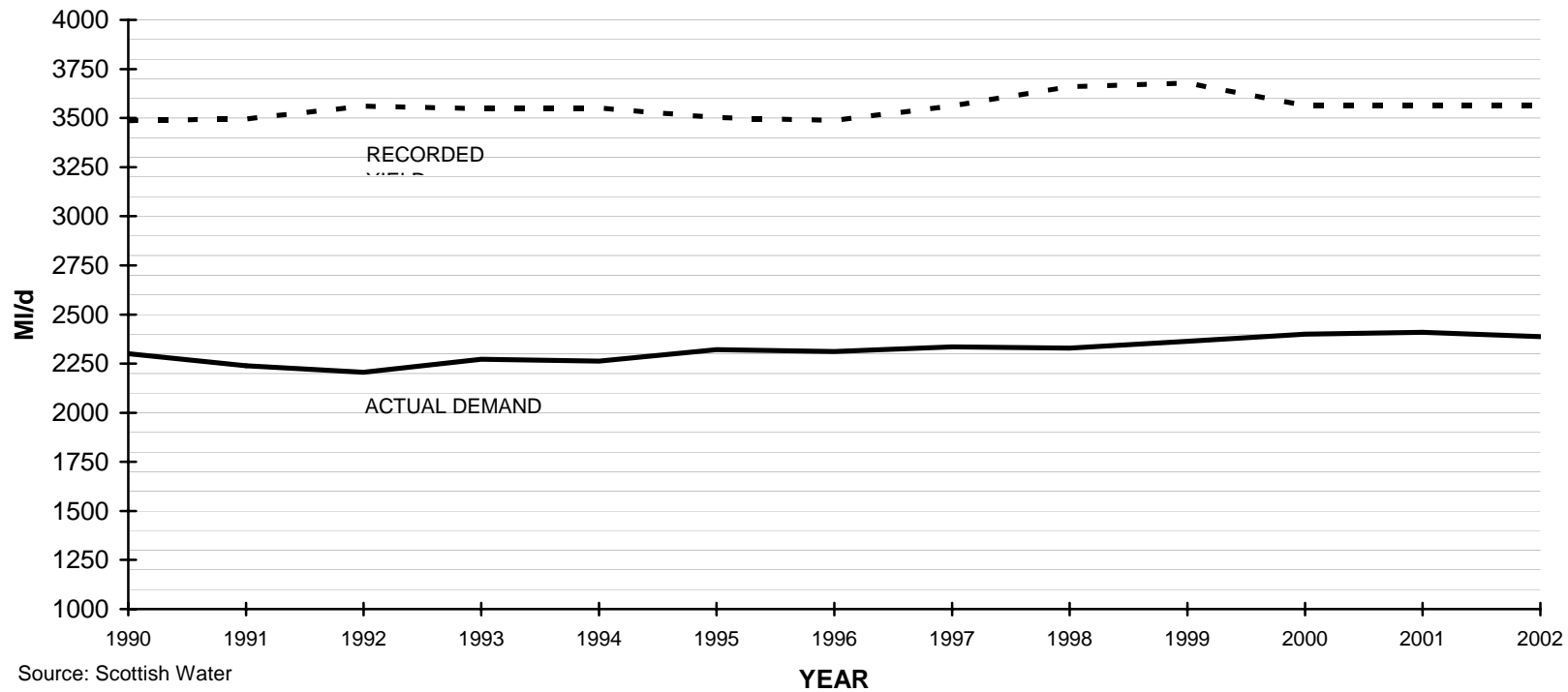
DEMAND PER CAPITA 1990-2002

Figure 6



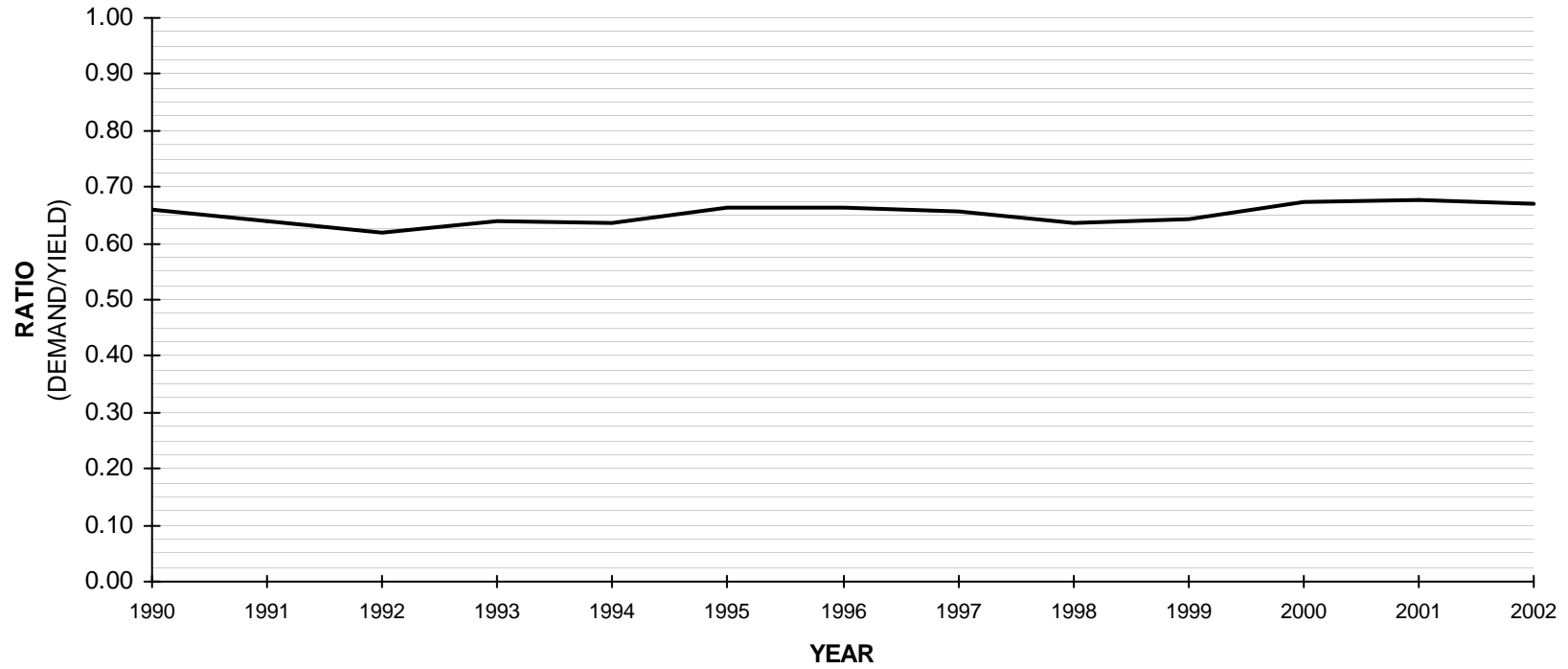
**RECORDED YIELD V DEMAND
(1990 - 2002)**

Figure 7



DEMAND/YIELD RATIO (1990-2002)

Figure 8



Source: Scottish Water

| WATER: SECTORAL BREAKDOWN OF NON-DOMESTIC DEMAND (MI/d) 2002/2003 (HIGH WATER USERS > 100,000 cu. m. per quarter) | | | TABLE D | |
|---|-----------------------|-----|---------------------------------|--|
| WIC Sector | WIC Sub-Sector | No. | Total | |
| 1 PETROCHEMICALS MAN. | | 3 | 11.42 | |
| 2 OTHER MANUFACTURING | 2 CONSTRUCTION | 1 | 11.64 | |
| | 4 OTHER MANUFACTURING | 8 | 60.05 | |
| 4 UTILITIES | 3 ELECTRIC | 5 | 14.95 | |
| | 4 MINING & QUARRIES | 1 | 13.99 | |
| 5 PUBLIC SECTOR | 2 HOSPITALS | 1 | 1.35 | |
| | 5 OTHER PUBLIC SECTOR | 1 | 2.91 | |
| 8 COMMERCIAL | 7 OTHER COMMERCIAL | 1 | 1.51 | |
| 9 FOOD MANUFACTURERS | | 1 | 1.62 | |
| 10 DRINKS MAN/BREWERIES | | 8 | 14.77 | |
| 11 PHARMACEUTICALS | | 2 | 7.27 | |
| 12 HI-TECH MANUFACTURER | | 5 | 10.27 | |
| Total of large users | | | 151.75 ^{(1) & (2)} | |
| Total of metered and non-potable | | | 452.13 | |

| Year | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 2000 | 2001 | 2002 |
|----------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| Total of large users | 508 | 501 | 439 | 472 | 459 | 420 | 324 | 426 | 241 | 201 | 300 | 276 | 152 |
| Total of metered and non-potable | 656 | 643 | 603 | 610 | 612 | 574 | 625 | 555 | 553 | 531 | 438 | 532 | 452 |

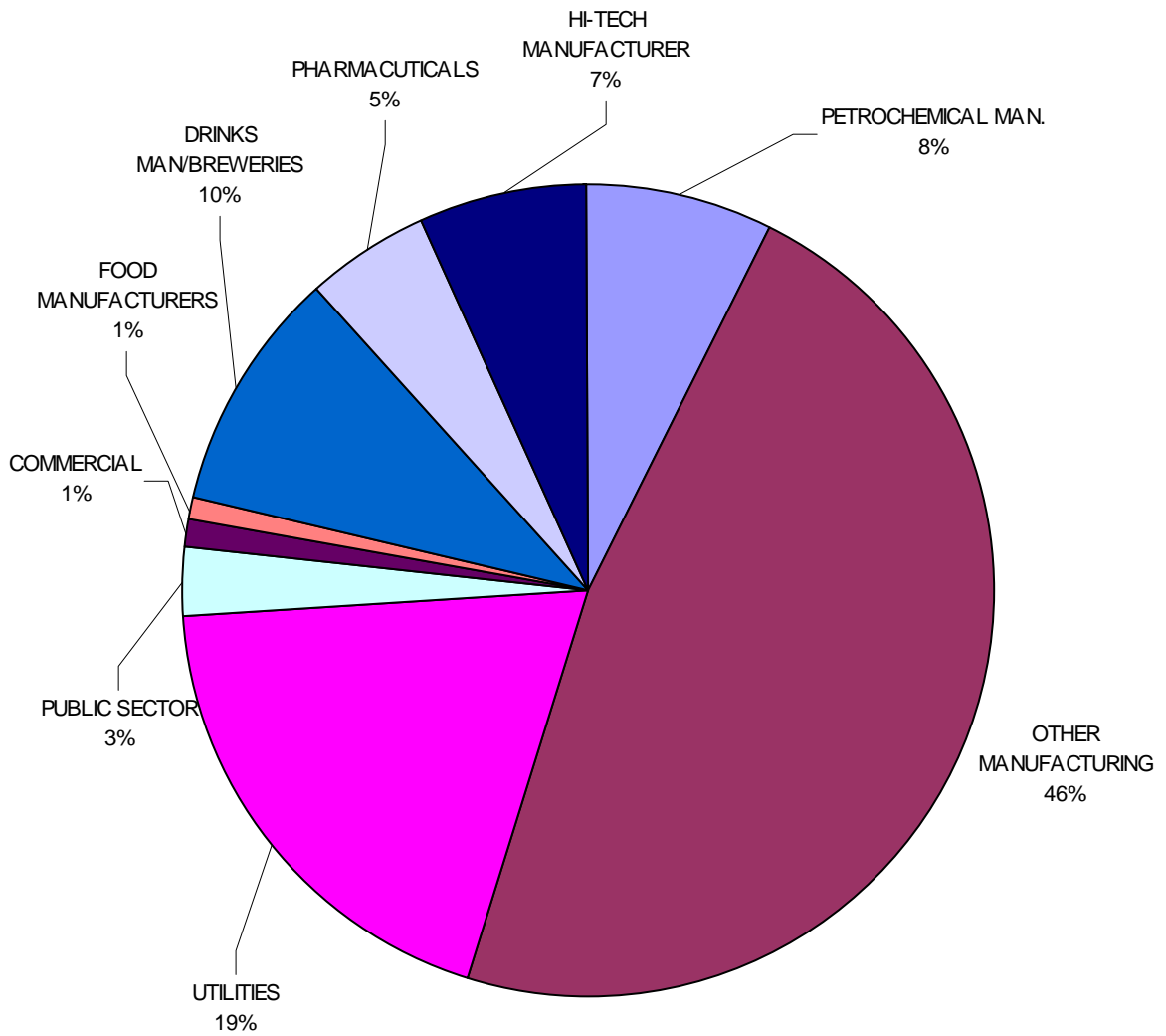
Note: (1) The methodology used to classify the sectoral use in 2002/2003 has been changed from Standard Industrial Classification to the new WIC Sectoral classification required for the WIC22 bi-annual submission. This is to ensure consistency in reporting methodology.

(2) The WIC22 bi-annual submission defines high users as having a consumption >400,000m³ per annum (100, 000m³ per quarter). The reporting methodology used in previous reports used a definition of large users as >1,000m³ per quarter.

Source: Scottish Water

**LARGE INDUSTRIAL USERS
(Sectoral Breakdown 2002)**

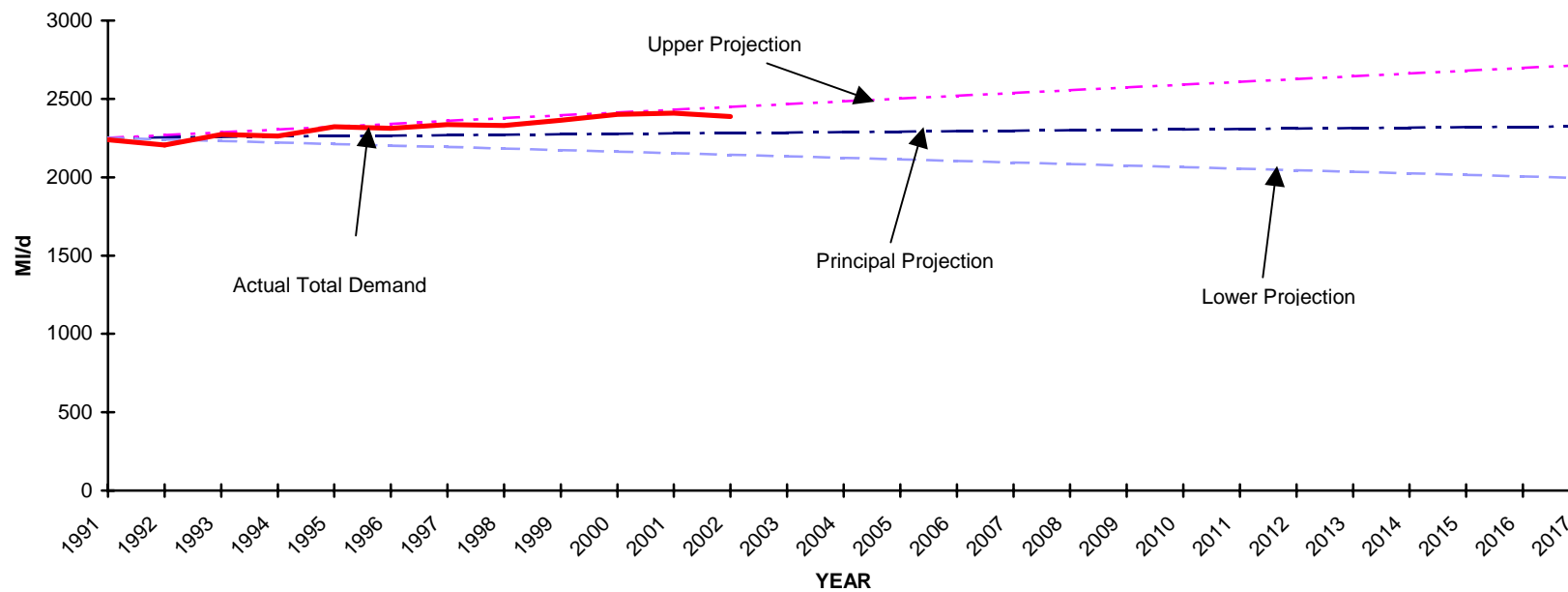
Figure 9



Source: Scottish Water

COMPARISON OF ACTUAL AND PREDICTED TOTAL DEMAND

Figure 10



Source: Scottish Water