WATER INDUSTRY COMMISSION for SCOTLAND

Reporter Services

Annual Return 2006-07
Reporter's Report

July 2007

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SCOTTISH WATER'S
ANNUAL RETURN 2006-07
REPORTER'S REPORT

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APPENDICIES

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1. INTRODUCTION

The Water Industry Commission for Scotland (WICS) has functions and duties under and the Water Industry (Scotland) Act 2002 as amended by the Water Services etc. (Scotland) Act 2005 for the regulation of the water industry in Scotland.

The WICS has appointed a named regulatory Reporter for the Scottish water industry to assist in the discharge of his duties. Mr David Arnell of Black & Veatch Limited is the named regulatory Reporter (the Reporter).

Scottish Water provides an Annual Return to WICS in June of each year which is a detailed return on all aspects of its business. The return provides information which will allow WICS to benchmark a variety of cost and performance information with the water and sewerage companies and water only companies in England & Wales.

The Reporter was instructed by WICS to undertake an audit of the Annual Return for 2006-07 (AR07).

The Water Services etc. (Scotland) Act 2005 required Scottish Water to separate its wholesale and retail activities. Separation took place in November 2006. Scottish Water was required by WICS to produce the 2007 Annual Return for the vertically integrated core business, as constituted prior to separation. The Reporter was instructed to undertake his audit on that basis. Accordingly, where this report refers to "Scottish Water", it is as constituted prior to separation, unless stated otherwise.

This report has been prepared by a Reporter's team under Mr Arnell's direction, composed of senior staff of Black & Veatch.

The team has followed the reporting requirements and has therefore focussed its attention on the tabular information. We have commented on Scottish Water's methodology either in an introduction to each set of tables or in our commentary on each table.

The team has studied the Annual Return 2007 as prepared by Scottish Water, and has followed a number of audit trails to establish the sources of information contained within that Return to assess its adequacy and accuracy.

Subject to the detailed comments stated in our report we believe that Scottish Water has met the reporting requirements, disclosed material assumptions and that Scottish Water's confidence grades are appropriate.

The audit report is divided into sections consistent with main sections of the Annual Return. An overview is provided of each section summarising key audit findings. Further sub-sections for each table in the return provide commentary on individual audits and detailed findings relevant to that table.

2. BOARD OVERVIEW

2.1 The Company's process for ensuring that the Board Overview is well founded

Day to day business in Scottish Water is controlled by the Business Management Team, chaired by the Chief Executive. Regulatory matters are delegated to the Regulatory Management Group. The Regulatory Management Group meets monthly throughout the year and comprises the Finance & Regulation and Asset Management Directors, the General Manager Regulation and the General Manager Customer Operations, in lieu of the vacant Customer Service Director post. Commencing in January, the Regulatory Management Group sets out the management requirements of the Annual Return.

The Director of Finance and Regulation, who chairs the Regulation Management Group and is also a member of the Board, regularly briefs the Board on regulatory issues. This ensures that the Board is well aware of the regulatory issues facing Scottish Water.

The Board Overview is drafted by the Regulation Department, using information available from the main report commentaries. A report, based on the Board Overview, and giving key messages is initially presented to the Audit Committee. The Audit Committee is chaired by a Non-Executive Director. The work of the Audit committee is discussed at Board Meetings on a quarterly basis, or by exception if required.

The Annual Return and, in particular, the Board Overview is a major agenda item at the Board Meeting that takes place in June. One week before the meeting the Board Overview and a supplementary explanatory paper is circulated to the Board. At the meeting, the Board Overview and explanatory paper is presented to the Board by the Director of Finance and Regulation and discussed by the Board. Any changes that the Board requires are made following the meeting and the document is signed by the Chief Executive using the delegated powers given to him.

The Annual Return is not generally read in full by the Board, although that option is always open to them, as the Executive Directors responsible for the information in the Return are able to report on the systems, processes and control measures used in the production of the Return and give assurance to the Board.

The process described above is similar to those that we have seen elsewhere and we believe that Scottish Water has an effective process for ensuring that the Board Overview is well founded.

2.2 The effectiveness of the Annual Return process

Prior to the report year Scottish Water set up a new group (Information, Data and Reporting or IDR) tasked with improving the quality of information required both within the business and for regulatory use. All non-financial information for the Annual Return has been managed by this group. Key features of the process are as follows:

- Prior to the Annual Return, the Regulation Department posts the Reporting Requirements, last year's company report, last year's Reporter's reports, a summary of last year's Reporter's recommendations and suggestions and last year's

queries from WIC and their responses on a dedicated intranet site. Relevant parts are also e-mailed to those responsible for providing the information. This allows all providers of information to have a full background to the new submission.

- The IDR group appoints an "Annual Return Co-ordinator" who is responsible for agreeing the methods to be used and that the information is provided.

- Each table has a "table owner" and each line has a "line owner". Each table has a technical reviewer. Responsibility is therefore clearly defined.

- A "technical approach" is written for each table or, if appropriate, groups of lines. The technical approach gives information on the person producing the line and the IT system used to generate the information. The technical approach then gives further information on how the information is generated, including, where appropriate, the formulae used.

- The IDR group produces the information and a draft narrative and undertakes quality assurance. The IDR group then sends the information to the Regulation Department.

- The Regulation Department reviews the commentary and undertakes its own checks on the tabular information. These checks include checks against prior years' information to see if trends and changes are sensible.

- Final drafts as agreed by the Regulation Department are sent back to IDR for final agreement.

- Final narratives are approved by the two executive directors responsible for the information.

This process is similar to the process that we have seen in other companies.

We believe that this means that the Company does have an effective process for completing its June Return. In particular we believe that the new IDR group is a positive step that has improved the process over prior years.

No matter how good, any process cannot guarantee that no mistakes are made. In particular we note that some of the data entries require analysis of the raw data. This is often carried out in spreadsheets developed for the purpose by individual line and table owners. In common with all the companies we report on we recommend that Scottish Water sets up a rolling programme of detailed reviews of the more important analysis tools to ensure that the approach and formulae used are consistent with the reporting requirements.

For the current return Scottish Water has acknowledged the uncertainty in some of the data being reported. We comment on these in our main report. We believe that Scottish Water is working hard to remedy its submission in these, relatively few, areas.

2.3 Consistency of the Board overview statements and supporting data

We have reviewed the narrative in the Board Overview against the knowledge gained from our audit. We have not re-audited every factual statement made in the Overview against information given in the main report. We have commented on the detailed points in our main report and do not repeat them here.

Based on our review we believe that the comments made in the Board Overview give a balanced picture of the Company's accomplishments and are consistent with the Annual Return.

2.4 Co-operation between the Company and the Reporter

Co-operation between Scottish Water and the Reporter has always been good but in past years it has not always been possible for the Reporter to undertake his work to a time scale demanded by the overall programme.

This year a number of improvements were made to the process.

For the first time a number of milestones were agreed between Scottish Water and the Reporter, with the objective of allowing the Reporter to have information earlier. These were given to WIC for further review. These milestones were met in full by Scottish Water and were helpful to the Reporter.

In addition, specific dates for the main audits were agreed between Scottish Water and the Reporter. For significant parts of the Return these dates were earlier than in previous years, and again were helpful to the Reporter. In some cases not all information was available at the time of audit, or only preliminary information was available. This necessitated some follow up meetings.

Scottish Water let the Reporter have a complete set of tables and narratives on the 31st May, which were helpful. In some instances information had changed, necessitating further work by the Reporter. A set of the final submission was sent to the Reporter on the 15th June together with a note of the changes that Scottish Water had made to the tables. This, latter information, was again useful to the Reporter.

We conclude that the process this year was significantly better than previous years. Difficulty remains in final 3 weeks where the time needed for the Reporter to complete his drafts and for Scottish Water to review and comment on them remains very limited.

2.5 Key trends in Scottish Water's performance

General

We have read the commentaries in the Board Overview. We do not comment on financial indicators and competition, which are outside our remit. Where we do have knowledge we believe that the comments in the Board Overview are consistent with the June Return and also consistent with the information arising out of our audits.

Below we comment on some of the items raised in the Board's Overview.

Key outputs and service delivery

Scottish Water reports that it's OPA score has increased to 229, a 38% increase over the previous year. We have audited this figure and give detailed comments in our specific report on the OPA. Over the last few years we have seen Scottish Water steadily improving its performance across many areas of the business and believe that these are correctly reflected in the new score. We believe that this is a very pleasing development.

During the report year Scottish Water has continued to roll out its use of hand held devices to record work done on the network. The use of these devices should ensure that information relating to low pressure, interruptions and sewer flooding incidents is of a better quality. The use of the handheld devices did cause some problems in data quality last year and not all of these problems have been eradicated for this year. This particularly concerns the recording of sewer flooding incidents. This is described in Scottish Water's Board Overview.

Following a slow start in 2005/6 we were pleased to see that Scottish Water has been active in improving its leakage control. Two new leakage managers have been appointed and a separate leakage team has been set up. The DMA coverage has been extended to 70%, up from 63% last year. Operability of DMAs currently remains low compared to other companies in England and Wales but is reflective of the establishment of new infrastructure and a new organisation. We do not believe that instant major reductions in leakage can be expected given the current levels of infrastructure and the newness of the leakage organisation in Scottish Water. This year Scottish Water missed its leakage target with a "actual" leakage reduction of 43 Mld (The headline figure was more but in part resulted from a revised estimate of unmeasured domestic per capita consumption and a revised estimate of consumption in unmeasured non domestic properties). Scottish Water did use the actual reduction figure in its calculation of the OPA.

This year Scottish Water again has an onerous leakage target. We believe that Scottish Water is unlikely to meet the target although we do expect Scottish Water's new infrastructure and organisation to deliver rapidly increasing leakage savings over the next two years.

Scottish Water has reported improvements in its response to customer billing contacts. Since November 1st 2006 billing contacts have been the responsibility of Scottish Water Business Stream. In future years the split responsibility will need to be reflected in the OPA score.

Compliance

Scottish Water continues to improve its drinking water quality compliance but there will always be some variability. Scottish Water's compliance in most parameters is now high but still marginally lags behind England and Wales in some parameters such as THMs and colour.

The company had 47 failing works at the end of the report year compared with target for the year of no more than 44. It notes that this is a key area of focus of the capital programme in 2007/08 and states its intention to undertake operational interventions to improve its

compliance position. One large failing works, which has a major impact on the OPA score, is a PPP works. We note that the number of failures year on year will be determined in part by weather patterns.

Progress on the capital programme

Scottish Water reports that it is 98% complete on the Q&SII programme. Completion is reported against internal beneficial use dates. There is an on-going process in place of regulator sign-off which will provide final confirmation of completion of the quality elements of the programme.

The company has noted the risks to delivery of some Q&S2 completion projects due to on-going difficulties in obtaining planning approvals and obtaining agreement from regulators on substitutions to determine the scope of works. During our audit we noted Scottish Water's processes addressing 3rd party risks in the Q&S3 programme. While Scottish Water cannot eliminate 3rd party risks, it was apparent that it had built on its experience in Q&S2 and has good procedures in place for managing these issues.

Scottish Water reports that the Q&SIII programme is compliant with the revised delivery plan of March 2007. Scottish Water also reports that the Minister has agreed a revised delivery plan of £610-650 M in 2007/8 to include both Q&SII and Q&SIII. The company has recognised that the progress of projects through internal approvals is critical to the delivery of the forecast investment. It has put in place actions plans and appointed managers to monitor and manage projects through the approvals process.

Key supporting information

Water resources, supply and demand and Security of Supply Index

Scottish Water reports its security of supply index for the first time this year. The results show that only 37% of the population are in zones with a surplus. Scottish Water also notes that a number of factors such as dry year demands, outage and headroom allowance all contribute towards the deficits. Scottish Water goes on to say that it believes that only 32% of its population (those with a deficit greater than 10%) are seriously at risk and that it will focus on these water resource zones in the coming year.

As a result of our audit we noted that Scottish Water was working towards more robust analyses of outage and headroom using the latest methodologies for its 2008 water resource plans. We also noted that Scottish Water remains at risk in a number of zones as SEPA finalises its review of water orders and abstraction licences. It is likely that significant shifts in the estimation of surplus/deficit zones will continue until this work has been done.

It is likely that many of the marginal water resource zones can be taken out of deficit as Scottish Water reduces its current levels of leakage towards its economic level.

We believe that Scottish Water is correct in its intention to focus its efforts on those zones with the greatest deficit. Nevertheless it is important that Scottish Water continues to work actively towards robust water resource plans using the latest methodologies.

Asset revaluation and the risk based approach to capital maintenance

In its narrative Scottish Water gives details of its future work in the areas of asset valuation and risk based approach to capital maintenance.

We note that during the report year Scottish Water has undertaken a significant number of surveys into the condition and performance of its overground assets. During the current year this will be supplemented by a further major programme of asset valuation. We believe that the assumptions underpinning the valuation should be discussed with WIC to ensure that all parties are in agreement. We also believe that Scottish Water should ensure that any future surveys also incorporate the needs of its asset management strategy under the Common Framework.

Information improvements

Scottish Water reports that it has achieved significant improvements in its information for this report year. We endorse this statement. From our audits we have noted improvements in recording low pressures and interruptions to supply. While not so advanced, improvements are also being made to recording flooding incidents. The overground asset condition surveys carried out this year have been a significant piece of work. As noted above, Scottish Water is currently beginning to undertake a major re-valuation of its assets. We believe that further improvements will be made for next year's Annual Return.

We view the setting up of the Information, Data and Reporting (IDR) as a very positive step.

Sustainable procurement

Scottish Water has not made any statement on sustainable procurement in its Board Overview. For this year's submission we have not investigated Scottish Water's revised procurement contractual arrangements.

3. AREAS OF MATERIAL DIFFERENCES OF OPINION

The Reporter's Protocol requires that the Reporter should summarise in a separate section of his report any material/significant areas where the Reporter's opinion is different from that of Scottish Water.

The Reporter's Protocol also required that the Reporter should annex to the reports to the Commission a summary schedule of his concerns and challenges and how they have been resolved, and in a separate section summarise any significant areas where agreement cannot be reached with Scottish Water.

A summary schedule of concerns and challenges and how they have been resolved are included in Appendix F.

There are no material or significant areas where the Reporter's opinion is different from that of Scottish Water.

4. SECTION A: BASE INFORMATION

4.1 Overview

Scottish Water has completed Tables A1 and A2 providing base information on connected and billed properties and population, volumes and loads.

The Reporter's team undertook sample audits to understand Scottish Water's methodology and test data sources. Through the audit it was possible to verify that:

- Assessments of properties and populations are based on sound data making appropriate use of published sources such as the General Register Office for Scotland population projections, spatially referenced address point data for domestic and business properties and internal billing and meter records.

- The allocation of unmeasured domestic properties continues to rely in part of the 2004-05 WIC4 returns from councils updated using growth figures which were calculated from the CTax base returns for 2004-05 and 2005-06. Scottish Water has noted that information in the current WIC4 returns does not provide the detailed breakdown of properties subject to discounts required to complete the P tables.

- Measured non-domestic property information is derived from Scottish Water's billing system, Hi Affinity, which also provides data used to prepare the WIC 22 reports. Customer numbers are reported at September 2006 while the reported volumes cover all customers served in the report year. Scottish Water has largely finished cleansing the base property data on Hi Affinity, which should give better information this year.

- There have been changes to the estimation methods for both unmeasured domestic and non-domestic consumption. This has impacted the estimate of leakage in the water balance.

- There is broad consistency between the A tables the E tables and the P tables.

- There is an error in the sewage loads reported in table A2 relating to the entry of data for non-households. This error is not carried forward to the E tables. We recommend that table A2 is resubmitted with correct figures.

- There have been changes in approach in some key data. In particular whether sewage loads and sludge disposal include PPP works and whether trade effluent property numbers are numbers of properties or numbers of customers. We recommend that the definitions of the relevant lines are confirmed to ensure consistency of reporting in the future.

4.2 Table A1: Base Information – Connected and Billed Properties

Commentary by REPORTER

Introduction

The sources of data and methodology are substantially the same as those reported for Table A2; this data is also used and reported on in the P tables.

Key points

Unmeasured properties

- The method used is similar to that used in the 2006 return. The number of properties has been estimated by updating the WIC4 figures for total households plus water and waste households for 2004-05, with growth in the Ctaxbase between 2004-05 and 2006-07.

- The number of void properties is taken from the Ctaxbase where they are described as unoccupied exemptions. In the Ctaxbase others described as other exemptions are reported in the exempts row.

- Scottish Water stated that it did not use this year's WIC4 in its entirety. It determined that the data was short in respect of around 19,000 properties. It knew that out of the 32 Councils, 15 were reporting correctly. It was also aware that out of the 17 remaining councils, who were Northgate software users, some were including second homes and others were not. Scottish Water could not match up the data for these Councils and therefore could not confirm the data and calculate an accurate growth figure.

- A new Reduction benefit discount was introduced on 1st April 2006. Data from Sept 2006 WIC4 for the Reduction Benefit Discount could be used for the calculation, as the Councils report a monetary value to Scottish Water each month via their financial statements. This monetary value was then used as guidance to match to the calculation produced on the Sept 06 WIC4.

Measured properties and unmeasured non households

- The source of all of the data on all measured properties and unmeasured non-household properties is the Hi Affinity system. Access to this system has been affected by the separation of the Scottish Water business during 2006 into two parts. These are Scottish Water (as network owner, referred to below as Scottish Water) and Scottish Water Business Stream (as service provider, referred to below as SWBS). Prior to the separation, which took place at the end of November 2006, Scottish Water had free access to Hi Affinity as a live system. Since the separation Hi Affinity is operated by SWBS and Scottish Water has access to Hi Affinity data as a series of month-end 'snapshots' taken by freezing Hi Affinity data on the last day of each calendar month. Live access is no longer possible for Scottish Water. During the audit this meant that it was not possible to audit customer information actually held in Hi Affinity as apposed to the monthly snapshots. We were able to talk to SWBS staff and have no reason to believe that the data is not accurate.

- We recommend that the Reporting Team's access to information on Hi Affinity should be considered for future years' audits.

- Data on measured domestic and all non-domestic properties have been taken from the Hi Affinity billing system at period 6. For the report year WIC 22 data is derived from the same source.

- Hi Affinity is currently the single source of information on numbers of meters. Hi Affinity data is currently being transferred to the Ellipse system to form the asset inventory for meters. This process is not yet complete. Routines will need to be developed to ensure that the two systems remain compatible in the future.

- Efforts continue to cleanse the data on Hi Affinity, including void and exempt properties. A small increase in the number of voids was noted compared with AR06, the aggregate effect of properties being added to and removed from the voids list. Around 3000 previously void properties were returned to charge in the year. All meters read are billed, unless listed as void, or known to relate to demolished properties. It is known that some meters still exist for demolished properties.

- Properties are never removed from Hi Affinity. Properties can be moved to void, exempt or demolished, but are not removed from the database.

- Exempt properties increased from 2427 (AR06) to 4531 (AR07). This is due to more accurate flagging of properties known to be exempt and receiving a zero bill, but not previously flagged as exempt. The increase in exempt properties reported has resulted in an increase in the reported number of un-metered non-domestic properties, as exempt properties are included in this total.

- This year's information for non-household properties in the A tables and P tables comes from the same source. Data checks confirmed that these tables are consistent. For the current year each line total in the P Tables is supported by a list of the properties allocated to that line.

- A small reduction has taken place in the number of measured non-household properties, due to continued cleansing of data to remove non-valid properties.

- Scottish Water is moving to meter all businesses which are currently un-metered. Steps taken to identify such businesses include the analysis of OS data and comparison with Scottish Water GIS data.

- We note the relatively high numbers of unmeasured non-households (13.5%). Scottish Water has set up a "Premises Valuation" team, which is currently reviewing void properties. As a result, there may be more information supporting these void levels next year.

- During the audit the OXERA report 'Scottish Water's non-household customer numbers' was also reviewed with Scottish Water staff.

    - OXERA were asked by WIC to comment on the number of non-households which should be being billed by Scottish Water. The total of these customers reported by the three predecessor water authorities was around 180,000.

However we were told during the review that these numbers included clearly non-valid 'properties' such as public toilets, hoardings and taxi ranks. Significant data cleansing has therefore taken place resulting in a reducing estimate of the number.

- The total number of measured and unmeasured non-household properties billed is reported in AR07 as 128,386 (lines A1.3 + A1.4). The source of this information is the Hi Affinity billing system. This compares with the OXERA view that, based on comparisons with England and Wales, the number of billed non-household customers is likely to be in the range 135,000 to 150,000, with the most credible estimate (based on IDBR data) being 141,000.

- No significant reduction in revenue has been seen as a result of the data cleansing. In discussion Scottish Water also stated that a good correlation had been found between Scottish Water records and local authority rating assessors files. This was however on the basis of a very small sample of 3-400 properties and further work would be required to substantiate this correlation.

- Scottish Water is investigating the difference between its own (bottom-up) figure and the (top-down) OXERA figure. Scottish Water is starting a project to sample-check representative areas of Scotland and extrapolates the data found to make its own estimate of total non-households for comparison with the OXERA figure. If this figure is significantly different from the current Scottish Water record of numbers then further work may be carried out to understand the difference.

Trade effluent

- A billed property can be occupied by more than one customer in a year. The numbers reported are the numbers of premises. In previous years the company has reported the number of customers in equivalent lines.

- The reported number of connected properties is the number with a trade effluent agreement. Many of these properties are billed as measured or non-measured household supplies because it is not considered cost effective to carry out the sampling required to apply trade effluent charges.

- Trade effluent loads include loads discharged to PPP treatment works. In previous years data for similar lines have been limited to loads discharged to Scottish Water treatment works.

Methodology – Unmeasured Domestic Properties

Scottish Water has based the number of unmeasured domestic properties receiving water and wastewater services on the WIC4 2004 return, updated by with growth from the Ctaxbase returns from the last 2 years. This is received from the Councils who bill on behalf of Scottish Water. Scottish Water considers that this year's WIC4 return was unsuitable for use in this report year. Scottish Water stated that it did not use this year's WIC4 in its entirety. It

determined that the data was short in respect of around 19,000 properties. It knew that out of the 32 Councils, 15 were reporting correctly. It was also aware that out of the 17 remaining councils, who were Northgate software users, some were including second homes and others were not. Scottish Water could not match up the data for these Councils and therefore could not confirm the data and calculate an accurate growth figure.

TheWIC4 return for each council area includes numbers for:

- Total households.
- Households connected to water and wastewater.
- Households connected to water only.
- Households connected to wastewater only.
- Households with no connections.

The household information is further sub-divided by Council Tax band and by any Council Tax reductions which apply. Scottish Water compiles this data into a format which is suitable for further analysis.

The Ctaxbase returns for each council are received as one large spreadsheet containing each council's data and a whole of Scotland section. Scottish Water uses this to prepare its annual return. The Ctaxbase return lists the following information:

- A breakdown of dwellings by band.
- Total no of dwellings on the valuation list
- Number of exempt dwellings
- Number of chargeable dwellings and those subject to disabled reduction
- Number of dwellings effectively subject to tax by virtue of disabled relief
- Number of adjusted chargeable dwellings
- Number of dwellings entitled to discount: 25%,
- Number of dwellings which were second homes, long term empty, or with disregarded adults (this was previously all in the 50% discount group – but this report year only disregarded adults are in the 50% discount – the other two have no discount)
- Number of others entitled to no discount
- No of unoccupied exemptions
- No of other exemptions.
- Equivalent no of dwellings for RSG purposes

- Ratio to Band D
- No of Band D Equivalents for RSG purposes

WIC 4 data is used as the base information: total household numbers, households connected to water and wastewater, households connected to water only, households connected to wastewater only and households with no connections. The 2006 data is also split by band and within band by benefit category (i.e. no benefit, partial benefit or full benefit). The households are also split by reduction category (no reduction, new reduction, 25% reduction, 50% reduction and no charge). The WIC4 2004 data was similarly split, but the reduction categories were as follows: no reduction, 25% and 50% reduction and no charge.

Growth in property numbers since 2004 is calculated from the Ctaxbase for each council area and is added to the 2004 WIC4 figures. This then results in the property numbers in each band for the report year. The total figures are now only reported in Table A1. The total by band and discount category is reported in the P tables. The total growth in property numbers in Scotland since 2004 was found to be 38620. The same growth figures were used for both water and wastewater. The figures may be a slight overestimate as all properties may not be connected to both services

The GRO gives projection data from 2004 for occupied households. These projections are used to produce figures for the report year plus one. In order to get the trend in new households (which Scottish Water assumes are connected to both water and wastewater), Scottish Water looks at the Ctaxbase growth between 2000 and the current year, for connected occupied and vacant property numbers (this trend is by council, status and band). This trend is applied to the GRO figures to enable the number of vacant properties to be calculated, and hence the predicted report year plus 1 figures.

Methodology – Measured property data.

Data on measured domestic and non-domestic properties have been taken from the Hi-Affinity billing system. For the report year WIC 22 data at period 6 is derived from the same source. Checks confirmed that the data in Table A1 are consistent with the period 6 WIC 22 return. Hi- Affinity is subject to internal audit by SWBS and routine daily verification is carried out, including checks on properties where metered volumes change by more than defined percentages between readings.

A comprehensive set of query routines based on a detailed technical specification have been produced to generate the outputs for the Annual Return. These queries also generate the information in the P tables which were seen to be consistent with the A tables. During the report year Scottish Water (and later Business Stream have put in a significant effort to cleanse the direct billing data on Hi Affinity. This is now substantially complete apart from the need to further cleanse data on voids. Continuing data cleansing is one reason for movements in reported numbers from previous years. As part of the data cleansing exercise Scottish Water has pursued non-payment of bills with a view to agreeing base information on the property with the customer. This was frequently a reason for both bills not being paid and multiple customer contacts and complaints. The data cleansing has therefore resulted in a number of advantages to Scottish Water.

Although the definitions for lines relating to measured properties state that the returns should be property numbers, the actual figures are based on meter numbers. Some properties will have multiple meters and some meters may serve more than one property.

Methodology – Properties connected during the report year

New connections may be made either by Scottish Water or a developer. Numbers of properties connected are taken from the WAMS/Ellipse system, which is updated upon the completion of each new connection. The Hi Affinity billing system is updated at the same time. A small number of new water connections do not have a corresponding foul water drainage connection due to self-treatment. For the purpose of reporting and billing it is assumed that each new foul connection also entails a surface water connection unless the customer proves otherwise.

Methodology – projections

In Table A1 Scottish Water has assumed that measured non households will grow by the 500 assumed by WIC at the price review. Previous projections had assumed 2000 optants would move from the unmeasured to measured tariff. This assumption remains in the P tables which are therefore inconsistent with Table A1.

Methodology – trade effluent

Trade effluent data is abstracted from the trade effluent billing and sampling records for the year.

Trade effluent strengths are recorded on the basis of settled COD for charging purposes. In addition, Scottish Water take a wide range of settled BOD samples, primarily for loads discharged to PPP plant to provide data required under the commercial terms of the contract. The extent of BOD information sampling provides a reasonably robust basis for estimating BOD loads where direct measurements are not available.

For the purpose of estimating works loads, the company takes the measured volume of trade effluent in the report year times the average measured concentration in the report year. Trade effluent bills are normally based on the volume in the relevant billing period times the average measured concentration in the previous calendar year. This approach provides both the trader and the company reasonable certainty on bills in a period. It does result in a difference in the reported loads in the A tables and billing information in the P tables.

The company applies a standard factor of 1.482 to uplifted settled loads used for billing to the unsettled loads reported in the A tables. This factor is an average of an historic set of measurements. We expect it to be reasonably representative across Scottish Water as a whole but less robust for individual treatment works.

Individual trade waste discharges are attributed to the relevant treatment works allowing loads to be summed for each works. The loads receiving secondary treatment are then summed based on the works types which are those used to complete tables E3 and E8.

During our audit of the reported figures we noted some minor discrepancies in load calculations due to the treatment of credits on supplier billing accounts. We believe that the overall impact on estimated loads is not material but suggest that the company reviews its methodology in this respect.

Figures are reported for all treatment works including PPP works.

The basis for the numbers of properties reported is described in the individual line commentaries below.

Comments by line

Lines 1, 6 12 & 17: As expected there is an increase in the number of household billed properties for water and wastewater, due to growth in property figures.

Line 1: This is the number of unmeasured household billed plus exempt and excluding void properties, which is increased by approximately 1% from the previous return.

Line 6: This is the number of billed, exempt and void properties connected to the water service. This has increased by less than 1% since the previous return.

Lines 8-9: These lines are now consistent with the assumed changes to volumes of water delivered to measured non-domestic customers reported at lines A2.14 and A2.15.

Lines 2, 7: The numbers of measured household water properties are taken from the Hi Affinity billing system. There is an increase of 114 in properties connected and billed for water from last years return. We understand that the small number of domestic metered properties in Scotland is due to the fact that the householder pays for the meter and the tariff is high compared to the unmeasured tariff.

Lines 4, 9: The numbers of measured non-household water properties are taken from the Hi Affinity billing system. There is a further reduction in numbers compared with last year, due to continuing data cleansing and the removal of non-valid properties.

Line 12: This is the number of unmeasured households billed plus exempt and excluding void properties, which is increased by approximately 1% from the previous return.

Lines 13, 18, 24, 31: The numbers of measured household drainage properties are taken from the Hi Affinity billing system. Numbers of metered household properties

connected and billed for drainage are small for the reason give above. They showed a small increase this year.

Lines 15,20,26,33: The numbers of measured non-household drainage properties are taken from the Hi Affinity billing system. These numbers have increased since last year, while the numbers of measured non-household water properties has reduced. This difference results from changes in the numbers of void properties for drainage and water properties respectively.

Lines 11,22,35: Numbers of new connections are taken from the WAMS/Ellipse database. This includes connections made by both Scottish Water and by developers carrying out self-lay connections. We accept that records are likely to be good, and certainly within the confidence grade assumed by Scottish Water.

Line17: This is the number of billed, exempt and void properties connected to the wastewater service. This has increased by less than 1% since the previous return.

Line 36: The reported data is the number of properties billed for trade effluent in the report year. Some properties billed in the report year will have been occupied by more than one customer. In 2005-06 the equivalent data entry in table A3 line 27 was the number of customers in the year and counted each occupier of the site separately.

Line 37: The number of connected properties includes all properties for which a trade effluent agreement has been created to control discharges to sewer. Many of these agreements are for small discharges where it would be uneconomic to bill for the discharge are trade effluent. Bills are raised under the normal un-measured or measured non-household regime. The company has advised us that the difference in lines 37 and 36 does not include void properties.

Lines 38 &39: The methodology for calculating the trade effluent load receiving secondary treatment is described above. The reported data includes trade effluent discharged to PPP treatment works which were excluded from the equivalent lines in table A4 in 2005-06. The COD:BOD ratio is 2.3, increased from 2.0 in 2005-06 based on SW treatment works records only.

Comment on Confidence Grade

We believe that the confidence grades reported by Scottish Water, for unmeasured households are reasonable.

The assigned grade of A2 is considered reasonable for numbers of measured properties. B2 is considered reasonable for numbers of properties connected.

Currently there is uncertainty around the numbers of unmeasured non households in lines 3, 8, 14, 19, 25 and 32. We also note a very high level of voids in these properties. Given this information, and until Scottish Water completes its proposed surveys, we believe that it may be more appropriate to apply a confidence grade of B3.

The number of billed and connected properties are taken from detailed records maintained by the company. We believe that an A2 confidence grade is appropriate for this data.

The estimated loads are based on detailed records but require some degree of extrapolation from limited number of samples and estimate volumes at year end. We consider a B3 confidence grade, which was applied to similar data in the 2005-06 return, to be appropriate for this data.

4.3 Table A2: Population, volumes and loads

Commentary by REPORTER

Introduction

The sources of data and methodology for population are the same Tables P1, P5 and P9. The household and property calculations are interlinked and the methodology discussed here also applies to the household figures in Table A1, and in the P tables.

The key points for Table A2 are:

- Population data is calculated from the GRO 2004 based projections (internet source www.gro-scotland.gov.uk/files/04pop-proj-scottishareas-table1.xls) updated with the September 2005 population estimate (internet source www.gro-scotland.gov.uk/files/05mype-cahb-t2.xls), the Scottish Executive's 2004 Local Authority household projections for Scotland (internet source www.gro-scotland.gov.uk/files/hproj-2004-c5.xls), and the 2004 Occupancy Rates (internet source www.gro-scotland.gov.uk/files/hproj-2004-c17.xls).

- The projection of future populations is calculated using the population projections from the Ctaxbase figures and Scottish Executive projections.

- Subject to any comments below we believe that the results in the table give a good indication of Scottish Water's water balance.

- Scottish Water gives a detailed narrative of the elements making up its water balance. Subject to any comments below we believe that it is an accurate account of Scottish Water's methodology.

- Leakage is measured using actively managed district metered areas (DMAs). The penetration of actively managed DMAs has increased to 70% this year from last year's figure of 63%. Scottish Water is required to complete a programme of setting up additional DMAs in 78 water resource zones agreed with SEPA as needing rapid resolution of resource issues under the WR1 and DW7 drivers. This will entail increasing penetration from the current 70% to around 90% coverage or more (by properties). While SW is working hard on its DMA programme we believe that to complete the additional DMAs in the time for them to be used in any initial calculation of current leakage or economic level of leakage (ELL) will be a very major challenge for Scottish Water. Until a penetration of 90% is achieved Scottish Water will have to continue to rely on estimating leakage as the residual from other inputs. It is therefore important that other items in the water balance are accurately estimated and the effect of significant changes on apparent leakage levels are fully understood.

- Scottish Water's methods this year are little changed from its calculations last year apart from two significant areas.

    - The estimate of domestic per capita consumption (PCC).

    - The estimate of unmeasured non-domestic consumption.

- There are also a number of small changes to water taken unbilled and distribution operational use, but overall the figures have only changed by a total of minus 1.4Mld or minus 3%.

- Basing leakage on the residual results in a leakage estimate of 1003.82 Mld, a reduction of 100.23 Mld over last year's figure of 1104 Mld. This reduction is made up as follows:

	Mld
Leakage reduction as balancing item	100.23
Less change in PCC	41.86
Less change in unmetered non domestic consumption	17.03
Less change in minor components	- 1.40
Reduction in actual leakage	42.74

  The figure of 42.74Mld can be compared to the reduction of distribution input of approximately 36Mld.

- Last year Scottish Water estimated its unmeasured domestic PCC as 139.1lcd, based on a survey carried out in 1999, during a limited part of the year. In 2005 this work was repeated at a different time of year which gave a figure of 142.lcd. While this gave confidence that the original figure had not changed markedly it has never been used by Scottish Water. In previous reports we gave our opinion that a true value of PCC could be in the order of 139.1 -2 to +8 Mld. This year Scottish Water has estimated its PCC as 147.7 lcd. This is based on:

  - an adjustment of 1.017 to represent a yearly average in 1999; and
  - an adjustment 1.042 to allow for growth in PCC between 1999/0 and 2006/7.

  Both adjustments are calculated from information on seasonal fluctuations and yearly growth from 3 companies: 2 in the north of England and 1 in Wales. These were chosen by Scottish Water as being comparable to its own position. The 3 companies' data varies as follows:

Adjustment	**Company X**	**Company Y**	**Company Z**
Seasonal	1.025	1.014	1.017
Growth: 1999/0 to 2006/7	1.0106	1.039	1.0774

  While the seasonal variations are similar there are significant differences between the growth variations. Scottish Water took an average of the 3 results. We conclude that Scottish Water's PCC is likely to be above the original 1999 figure but that the final figure is uncertain, given the disparities in the 3 growth

rates. Scottish Water should have much improved figures next year provided that its consumption monitor begins to give readings later in the year.

The revised figure of 147.7 lcd excludes plumbing losses which are included in the published figures of other companies. Including Scottish Water's estimated plumbing losses increases the 147.7 lcd to 153.7 lcd. This figure can be compared to the WASC average for England and Wales of 152 lcd in 2005/6.

- This year Scottish Water has made a significant change to its estimate of consumption by unmeasured non-households, increasing the estimate by 17 Mld. Estimating consumption from unmeasured non households is difficult without metering a statistically adequate sample. In previous year's Scottish Water based it estimate on a value of 37.3 m3/year per £1000 of Rateable Value. We concluded that the accuracy of this figure was uncertain. This year Scottish Water has analysed its metered non households by WIC sector codes (e.g. hotels, banks) and rateable value bands. For each sector and RV band, consumption and rateable values were plotted and linear regression curves calculated. These were then used to calculate the consumptions of each unmeasured non-household based on its rateable value. During our audit we noted that:

  - The measured and unmeasured datasets were reasonably comparable despite our initial fear that the measured non-households would be significantly bigger. Scottish Water informed us that this was because Glasgow in particular had had a universal metering policy.

  - Within each WIC band there was a broad relationship of consumption increasing with RV although, within a band there was often little relationship (i.e. the curve was flat).

  Scottish Water has started a metering project for unmeasured non-households but as yet has little data. Significant progress is planned for this year and so much more reliable figures should be available for the next AR. We conclude that the new method of analysis is reasonable and that the new figure may possibly be better than the old figure. However, the new figure should still be viewed as uncertain.

- This year Scottish Water has reduced its estimate of minor component consumption (water taken legally, illegally and distribution operational use) by 1.4 Mld. This is scarcely material when compared to other changes. Changes are largely due to real changes in such things as standpipes but there are some minor changes in assumptions. Scottish Water is able to improve the accuracy of its figures by undertaking metering programmes but we acknowledge that this may not be cost effective. The current total of 43.66 Mld is high compared to other companies.

- While we were disappointed last year to see that more had not been done to set up an effective leakage control organisation we note that this year 2 leakage managers have been appointed, the DMA programme is progressing and an organisational structure is being built. Given that true leakage reduction this year has been well short of WIC's target leakage reduction remains a very severe challenge to Scottish Water.

- We conclude that the larger part of the reduction in estimated leakage (59%) is due to changes in the estimates of other items in the water balance rather than an actual reduction in leakage. The calculations of the other elements are reasonable but they remain uncertain. If Scottish Water sets up its new PCC monitor and makes significant progress in metering unmeasured non-households then the figures next year should be significantly better.

- The reported sludge quantity has reduced by 12% in the report year against an estimated reduction of 3.5% in load discharged to sewer. Part of the change is due to a change in methodology with greater reliance on measured quantities and less on estimates from population equivalents than in previous years. We suggest that the company continues to review significant differences in measured sludge quantities and estimates from population equivalents at individual works or treatment centres.

Comments on Methodology

Populations

Winter Population Estimates

Population data is calculated using:

- the GRO 2004 based projections, available on the internet;

- the September 2005 population estimate, also available on the internet;

- the Scottish Executive's 2004 Local Authority household projections for Scotland, again available on the internet.; and

- the 2004 Occupancy Rates, also available on the internet.

The methodology is similar to that used in the previous report year.

Scottish Water has stated that the winter population for water and wastewater is the population in households with water (unmeasured) plus the population not in households with water plus the measured household population.

The estimated winter population connected to the water service (A2.1) comprises the following: Line A2.3 + Line A2.4 +population not in households with water (85,861). The population not in households with water is calculated from (the occupied population with water /occupied household population) x population not in households. This gives a total of 4,954,732. Further information is given below:

Population in unmeasured households with water

The occupied household population number is calculated from the GRO occupancy rate and the GRO number of occupied households (which is updated from the 2004 based projections by the 2005 based estimate).

From the calculations for table A1, the number of SW connected occupied households is known.

The GRO occupied household population is divided by the SW connected occupied household figure to get a SW occupancy rate.

The Updated 2004 WIC4 households connected to water (unmeasured) are multiplied by the SW occupancy rate to get the household population with water. The same is method is followed for wastewater.

Population not in households with water

The total population is known from the GRO figures (adjusted by the most recent mid-year update). From this the occupied household population is subtracted, this leads to the population not in households. The population not in households with water is calculated as follows. It is assumed that the population not in households with water is the same proportion of the population not in households, as the occupied household population with water is of the occupied household population. The same calculation follows for wastewater.

The unoccupied household numbers with water and wastewater can also be calculated (i.e. those with 50% discount and those vacant {a derived figure}).

Population projections in future years

The following methodology was used for the calculation of population projections, and differs slightly from the method in the previous return:

The Ctaxbases for 2000 and 2006 were used to calculate the growth rate in occupied and unoccupied households between 2000 and 2006.

Scottish Executive 2004 based occupied household projections, and the recent midyear update, were used to calculate growth in occupied households for each council tax area and in conjunction with the Ctaxbase growth above were used to calculate the number of occupied, unoccupied and the total number of households, the Occupied household populations with water and wastewater and the population not in households with water and wastewater, in each council tax area, and therefore the projected figures for the report year plus 1.

Summer Population estimates

The summer population is the winter population plus the tourist population.

Scottish Water has based its assessment of additional summer populations on:

- VisitScotland information on average bed space per type of holiday accommodation. This is the same data as was used in the previous return.
- VisitScotland information on the monthly occupancy rate for different types of holiday accommodation.

- Allocation of holiday accommodation properties to water supply and drainage area boundaries using the spatially referenced "Yellow Point" data set of business properties referenced on the corporate GIS. The tourist categories considered by SW from "Yellow Point" data were Hotels & Inns, Guest Houses, Caravan Parks – Holiday, Holiday Accommodation & Parks, Camping Sites, Bed & Breakfast, Hostels and Self Catering Accommodation.

The populations were calculated from the number of bedspaces per property type and the monthly occupancy figures from Visit Scotland, allocated across the water operational and sewered areas. The total number of bedspaces per property type is calculated, and these can be mapped in each operational area. For all of Scotland the number of occupied bedspace nights is calculated. This is the monthly occupancy times the number of bedspaces which can be summed over the 12 month period, to calculate the average. The peak month is used to calculate the summer population. A bedspace night is the number of days in the month times the number of bedspaces times the occupancy rate. This can be calculated for each property type. Scottish Water was able to demonstrate its methodology for allocating summer populations from the source data to the allocation of properties to individual water supply zones and sewered areas.

The difference in summer and winter populations of 257,340 is the highest tourist population in any one month in the year. The peak month in AR07 was August, and was for population connected to water.

We consider the approach to be a reasonable use of the data available to Scottish Water.

Overall water balance

Introduction

There are two main methods of preparing a water balance:

- Measure all inputs making up water use and subtract them from distribution input (DI). The balancing item is leakage, which itself is not measured. This is sometimes called the Integrated Flow Method.

- Measure all inputs including leakage and compare them with DI. The closing error gives an indication of the accuracy of the inputs. A closing error of < 5% is usually taken as an indicator of robust procedures. The closing error is often distributed to the inputs using a "maximum likelihood" method.

The second method, which is preferable to the first, can only be used if leakage throughout approximately 90% of a measurement area (ideally the whole of a water utility's area) can be directly measured. This is usually done using district meter areas (DMA). Scottish Water currently has a 70% coverage of DMAs, installed as part of its on-going developments in leakage control (up from 63% last year). Of these, approximately 76% are currently giving estimates of leakage, up from 71% last year. This is equivalent to an overall coverage of approximately 50% of Scottish Water's customers (45% last year).

Because Scottish Water currently has a low penetration of DMAs we accept that Scottish Water has to prepare its water balance on the basis of the Integrated Flow Method (Method 1).

Unmeasured per-capita domestic consumption

In 1991 and 1999 the predecessor organisations to Scottish Water carried out investigations into domestic unmeasured per capita consumption (PCC). The studies were not constructed to find the PCC in each authority's area but rather to find an average PCC for the whole of Scotland. The studies concluded that the PCC in 1991 was approximately 148 lcd and in 1999 139 lcd. We are not aware that the reduction in PCC between 1991 and 1999 was ever fully explained. However, the 1999 study employed a number of advances over the preceding study, such as the use of more accurate meters, and is likely to have resulted in a more accurate answer. A number of features of the study were:

- The study was based on the analysis of nightlines in district meter areas and was not based on individual household monitors.
- The study was of limited duration, with two, two week monitoring periods, one in September and one in November. As such the study did not include for the higher demand in the summer months.
- The study report states that the areas chosen were not fully reflective of the housing and social mix in Scotland.
- The lowest 5 minute nightline was taken as the estimate of leakage. During this period legitimate night use was assumed to be zero. It is likely that in a number of cases there was some legitimate night use, in which case, leakage would be overestimated and consumption under estimated.
- Plumbing losses would be recorded in the lowest nightline and assumed to be leakage. The derived PCC would therefore not include for plumbing losses.

PCC varies throughout the year and there is some evidence that consumption in September is a reasonable representative of the average yearly consumption. However, November is likely to be a below average month.

For the 1999 study we conclude that:

- The study was competently carried out, within the limitations of the chosen methodology.
- The resulting PCC is likely to be marginally low as a measure of the yearly average PCC.
- There is some uncertainty in the resulting figure as the monitor was not fully representative of Scotland's population.

In March/April 2005 Scottish Water undertook a "refresh study" of the 1999 work by repeating the flow logging in most of the 1999 sample areas (51 areas covering about 10,000 properties). All the areas were examined and any deficiencies in meters or valving were

rectified. The same basic methodology as the 1999 study was used. A number of assumptions were made:

- The populations were identified by CACI, who provide many population statistics. These were assumed to be resident at the time the measurement took place
- It was assumed that the absolute minimum recorded night flow was wholly unaccounted for water (no allowance was made for legitimate night use)
- Metered non-domestic flows were deducted from the minimum 5 minute inflow data to give the unaccounted for flow.
- Where there were unmetered non-domestic properties, the domestic PCC was determined assuming that each unmetered non-domestic property had the same consumption as a domestic property. Some unmetered non-domestic properties will comprise mixed occupancy such as flats associated with small businesses. These may well have similar characteristics to domestic properties but equally some will have very different characteristics. Depending on the number of such properties in the sample areas this assumption may affect the accuracy of the answer.
- Meters installed at the time of the 1999 Study were providing measurements within manufacturer's certified parameters, and remained correctly sized.
- If non-household properties were not metered, or where the meter could not be logged, then daily manual readings were taken and assumed daily profiles of use established based upon the types of premises.
- As for the 1999 Study, it was assumed that the sample areas contained a mix of household types with the same proportions as Scottish Water as a whole. The median value of estimated PCC was used as the value of PCC for Scotland.

Some of these assumptions need not have been made if further work had been done. However, we acknowledge that the study was carried out in a limited time period with the objective of seeing if the 1999 study results remained reasonable. Even with these limitations we believe that the study has served a useful purpose, and added confidence that the 1999 figures, that still form the basis of the current domestic PCC, are not unreasonable.

The new study gave a figure of 142 lcd, 3 lcd greater than the 1999 figure. Evidence available to us from elsewhere indicates that consumption in April/May could well be greater by roughly this amount from a figure taken in September/November.

In previous years we suggested that the level of confidence that should be put on the 1999 value was difficult to assess but could be of the order of -2 lcd + 8 lcd.

This year Scottish Water has estimated its PCC as 147.7 lcd. This is based on:

- An adjustment of 1.017 to represent a yearly average in 1999; and
- An adjustment 1.042 to allow for growth in PCC between 1999/0 and 2006/7.

Both adjustments are calculated from information on seasonal fluctuations and yearly growth from 3 companies: 2 in the north of England and 1 in Wales. These were chosen by Scottish Water as being comparable to its own position. The 3 companies' data varies as follows:

Adjustment	Company X	Company Y	Company Z
Seasonal	1.025	1.014	1.017
Growth: 1999/0 to 2006/7	1.0106	1.039	1.0774

We have audit the calculations back to the base data received from the 3 companies and accept that the calculations have been properly done.

While the seasonal variations are similar there are significant differences between the growth variations. Scottish Water took an average of the 3 results. Other datasets are likely to give different results. The two companies that came from the North of England had the lower growth rates. The growth in Scottish Water's PCC may not follow those in England and Wales. We conclude that Scottish Water's PCC is likely to be above the original 1999 figure but that the final figure is uncertain, given the disparities in the 3 growth rates. Scottish Water should have much improved figures next year provided that its consumption monitor begins to give readings later in the year.

The revised figure of 147.7 lcd excludes plumbing losses which are included in the published figures of other companies. Including Scottish Water's estimated plumbing losses increases the 147.7 lcd to 153.7 lcd. This figure can be compared to the WASC average for England and Wales of 152 lcd in 2005/6.

Total unmeasured domestic consumption

Total unmeasured domestic consumption is calculated by multiplying the PCC by estimated population. The basis of the population figures has been described in our narrative on Table A1.

The unmeasured consumption figure includes for exempted properties. These are properties that consume water but are billed at a zero rate. Scottish Water allocates them to this category on the basis that they are billed. In similar circumstances others could allocate such properties to water taken legally unbilled.

Plumbing losses

Plumbing losses are added to the base unmeasured PCC. We accept that this is correct as plumbing losses were measured in the minimum nightlines (and hence subtracted) in the base PCC calculations. Plumbing losses are measured in metered consumptions.

Scottish Water has made no change to its method of calculation of plumbing losses this year.

Plumbing losses are based on a "Managing Leakage" default, corrected for pressure, diurnal pressure variations (hour/day factor) and an infrastructure correction factor (ICF). The latter is built into the consultant's software and follows the "Managing Leakage" methodology. Plumbing losses adds about 6.0 lcd (slightly down from 6.4 lcd last year) to the current

estimate of 147.7 lcd. Following our concerns, in previous years Scottish Water re-estimated the plumbing losses without applying an ICF, reporting a reduction of 3.3%. We accept that this is hardly material.

This year plumbing losses have marginally decreased from last years figure. This comes from the calculation in Scottish Water's analysis tool "Perform Spatial Plus" (PSP), which assumes that plumbing losses vary as the pressure in the DMA varies. Revised figures have been measured for many areas in the year as new DMAs have been added. Given that most properties have break pressure tanks in the roof and many plumbing losses will be on the low pressure system it is unlikely that the relationship will be as direct as that built into PSP. However, we accept that any inaccuracy is hardly material both in absolute terms and in relation to the likely inaccuracy of the original "Managing Leakage" figure.

Measured household consumption

Scottish Water has approximately 595 measured households and so measured household consumption forms a small part of the water balance. Consumption is recorded by meter and, subject to meter under-registration, should be accurate. It is interesting to note that measured consumption at approximately 245lcd is higher than unmeasured consumption. We understand that a number of these properties are farms and other higher-occupancy properties such as holiday cottage complexes which could well provide the explanation.

Measured non-household consumption (potable)

Consumption is recorded by meter and, subject to meter under-registration, should be accurate.

Measured non-household consumption is derived from all metered water supplies taken from Scottish Water's billings system (Hi-Affinity) at end March 2007. This is different from the number of properties which are reported for mid-year in Table A1.

The quantity of measured non-household consumption in the report year is calculated from meter readings which are extrapolated or interpolated to estimate a quantity from 1st April to 31st March as follows:

- The quantity from the 1st April to the first meter reading in the year is interpolated from the meter reading immediately before and after the 1st April on the basis of calendar days.

- The quantity from the last meter reading in the report year to the 31st March is extrapolated from the last meter readings available over a period as close as possible to 365 days.

This has been confirmed by audit in previous years. While the method is logical the latter extrapolation may slightly over-estimate consumption if, as is likely, consumption in higher in the summer period than the winter period over which the extrapolation is used.

For the projection Scottish Water has taken the yearly changes estimated by WIC in its final determination from the base year.

Measured non-household (non-potable)

This is generally based on meter readings from Hi Affinity, although we understand that one large customer is on an unmeasured tariff and consequently has an estimated figure (4.5 Mld). The figure is slightly up on last year. This is partly due to a new customer but all consumptions other than the estimated figure have changed due to normal variation. While the estimated part of the figure remains at about 33% of the total our comment from previous years that "while non potable water volumes are not a large part of the water balance this is clearly an area of significant uncertainty that Scottish Water should aim to clarify for future returns" remains.

Meter under-registration

Scottish Water does not undertake routine calibration of its domestic meters. As for previous years it has applied a meter under-registration figure of 3.2%, based on the England and Wales water and sewerage companies average as reported by Ofwat. While this is a generally accepted figure our experience is that this may be high. However, as Scottish Water only has 595 domestic meters the figure is clearly immaterial and we do not suggest that Scottish Water attempts to calibrate its meters.

Scottish Water has not calibrated its non-domestic meters. As in previous year's it has applied a meter under-registration figure based on Ofwat published information. This year the figure is 4.8% slightly up on last year's figure of 4.6%. This figure is consistent with our knowledge where calibration has been done and so we believe that the resulting estimate is acceptable.

Over a period of time some original meter sizing for non domestic customers can become inappropriate, resulting in miss-reading. We understand that Scottish Water has undertaken a right sizing project a few years ago and it is possible that actual meter under-registration is lower than that implied by the England and Wales average figures.

Unmeasured non-households

Consumption in unmeasured non-households is very difficult to estimate unless sample surveys have been carried out. Last year, Scottish Water's estimate remained based on a figure of 37.3 m3 per year per £1000 of rateable value, which was based on work done for the setting of charges in 2002 for 2003/04. At that time Scottish Water's analysis of the water use of metered customers that were likely to be found in the unmetered category, supported by the experience of East of Scotland Water's compulsory metering programme (1999 - 2002), suggested that the average overall water use relationship was actually around 40m3 per £1,000 RV. This approach was accepted for the Scheme of Charges for 2003/04. Scottish Water further reported that when Scottish Water harmonised unmetered water charges in April 2003 the unmetered water charge was 2.5p per £RV per year. The volumetric charge for water was 67p per m3. This gave an implied consumption of 37.3m3/year/£,000 RV (2.5 x 1000 / 67). We did not audit the basis of this work but accepted that consumption of metered customers could form the basis of the figure provided that metered customers of a similar size to unmetered were taken as the basis of the comparison. At the time we also noted that the calculation resulted in an approximate average figure of 1000 l/prop/day. This figure is not dissimilar to figures we had seen elsewhere. We concluded that the figures were acceptable, although we believed that it should be considered to be uncertain.

For this year Scottish Water has recalculated it figures, resulting in an increase of 30% over the previous figure. The re-analysis has again compared metered and non-metered consumption using rateable value as a descriptor. This time Scottish Water has carried out the analysis by WIC sector codes (e.g. hotels, banks) as well as rateable value bands. Using the metered non-households, for each sector and RV band, consumption and rateable values were plotted and linear regression curves calculated. These were then used to calculate the consumptions of each unmeasured non-household based on its rateable value. During our audit we noted that:

- The measured and unmeasured datasets were reasonably comparable despite our initial fear that the measured non-households would be significantly bigger. Scottish Water informed us that this was because Glasgow in particular had had a universal metering policy.

- Within each WIC band there was a broad relationship of consumption increasing with RV although, within a band there was often little relationship (i.e. the curve was flat).

We conclude that the new method of analysis is reasonable and that the new figure may possibly be better than the old figure (depending on the exact calculations done at the time). However, the increase does make Scottish Water an outlier compared with our previous experience, but we accept that the estimates of all companies are likely to be very uncertain. In our view the new figure continues to be uncertain.

Scottish Water has started a metering project for unmeasured non-households but as yet has little data. Significant progress is planned for this year and so much more reliable figures should be available for the next AR.

Underground supply pipe leakage

The calculation of underground supply pipe leakage remains unaltered from previous years.

In order to calculate water delivered, underground supply pipe leakage is added to consumption. Underground supply pipe leakage is difficult to measure and many water companies continue to use the "Managing Leakage" default of 50 l/prop/day, possibly modified by the development of free supply pipe replacement programmes. However, figures reported by Ofwat in the mid 1990s indicated higher figures were being assumed. In England and Wales underground supply pipe leakage is becoming less prominent as water companies are held responsible for all leakage, whether from their communication pipe or the customer's supply pipe.

Supply pipe leakage comprises background losses from weeping joints and other small leaks plus significant losses from bursts on a relatively few number of properties. It is the latter amount that is the most difficult to estimate.

Scottish Water has estimated its underground supply pipe losses on unmeasured domestic customers at 61.08 l/prop/day (compared to 61.5 l/prop/day last year), significantly higher than comparable figures in England and Wales today but of the same order as the mid 1990s. Scottish Water argues that this is the right figure for comparison purposes. The estimate is a weighted average for different property types and whether the meter is external or internal.

The final figure is made up of background leakage of 13 l/prop/day and burst leakage of 48.0 l/prop/day. The base data for the calculation remains as for last year. The former figure comes from Managing Leakage. The latter comes from surveys carried out in previous years but moderated for differing pressures and assumed run rates of bursts as more DMAs are commissioned. These changes have only had a marginal effect on the final estimates. The burst leakage is calculated as follows:

- The number of supply pipe bursts believed to be running. This comes from a study of the results of numbers of identified supply pipe bursts in those district meter areas with active leakage control. While identifying most supply pipe bursts active leakage control may not find all. Numbers are therefore likely to be under reported rather than over reported. While the sample was large it was not necessarily representative and this may be a source of some additional inaccuracy.

- The numbers of supply pipe bursts found in the areas divided by the number of properties was taken as the average number of bursts per property in areas where there was no active leakage control. For those areas where there was active leakage control the numbers running at the end of the year was taken as the average running at any one time in regularly swept areas.

- The leakage rate from the bursts. This has been taken as 1.05 m3 per hour (at 50m average zonal night time pressure). This comes from a sample of 40 supply pipes where leaks were measured before repair.

- The time that the leak is running. For non DMA areas this has been taken as 365 days as currently Scottish Water does not repair such leaks.

We note that the UKWIR research project into supply pipe leakage has now been published and that Scottish Water is currently reviewing it to see what it can do to further develop its methods. We recommend that Scottish Water continues to develop its sampling to confirm current assumptions as well as seeing if it can develop its methods.

Having calculated supply pipe leakage for domestic properties as described above Scottish Water has used published data for England and Wales to calculate supply pipe leakage for other categories. The general view in the industry is that leakage on externally metered properties is 50% of un-metered properties as the customer will pick up the fact that he has a leak when his bill is increased for additional usage. Scottish Water's figures are consistent with this assumption.

Overall we conclude that:

1. All estimates of supply pipe leakage are uncertain.

2. Results are still based on a relatively small sample of estimated run rates for bursts and background leakage is taken as an industry average.

3. Scottish Water's figures are higher than those typically used in England and Wales. However, we accept that this could be the case until Scottish Water has a more active system for repairing supply pipe leaks. In particular Scottish Water should keep good records of the time taken to become aware of the leak and repair it so that it can benchmark itself against other companies. This statistic

will also allow us to judge whether supply pipe leakage is indeed likely to be above those in England and Wales.

4. Even though the current figure is uncertain we accept that it is a reasonable figure to use in this return.

Distribution and service reservoir leakage

The prime tool used in active leakage control is to measure flows at night when consumption is low in small areas called district meter areas (DMAs). Scottish Water reports that currently it has an estimated 70% coverage of DMAs

Scottish Water's current coverage of 70% is significantly up from last year's coverage of 63.1%. Of these approximately 76% are currently giving estimates of leakage, up from 71% last year. This is equivalent to an overall coverage of approximately 50% of Scottish Water's customers (45% last year

New DMAs are now handed over to Operations before backlog leakage is removed. Pressure reducing valves (PRVs) are installed where pressure control is considered appropriate. Most of the loggers telemeter their data at daily intervals. In some rural areas the loggers are downloaded by hand.

We understand that Scottish Water is required to complete a programme of setting up additional DMAs in 78 water resource zones agreed with SEPA as needing rapid resolution of resource issues under the WR1 and DW7 drivers. This will entail increasing penetration from the current 70% to around 90% coverage or more (by properties). While Scottish Water is now making better progress on its DMA programme we understand that it has now been accepted that not all the additional DMAs will be in place and giving data in the time for them to be used in any initial calculation of current leakage or economic level of leakage. (ELL) due in by December 2007. This should be less of a problem for the final ELL due for submission in December 2008.

Scottish Water manages its active leakage control using a software package called Perform Spatial Plus (PSP). This analyses minimum night flows (as downloaded from the loggers) to estimate leakage rates in the DMAs. Controls are set to prioritise interventions. This software, which has been in use for around 2 years, is an improvement on the old programme and should improve current DMA analysis. Hour day and other assumptions built into the software generally follow industry standards.

PSP has been used to estimate leakage in the DMA areas for this return. All data has been used, even if the DMA has little data. In those areas where only limited data is available the accuracy of the results will be lower. The result of the analysis has been extrapolated to the whole of Scotland, further reducing the accuracy of the result. The result indicates a possible leakage level of approximately 834 Mld over the whole of Scottish Water's area (894Mld last year).

A proper estimate of overall leakage using DMA analysis is not possible until a coverage of approximately 90% is achieved. Scottish Water should reach this target when the DMAs in the 78 water resource zones noted as high priority have been established in March 2008. Therefore until the reporting year 2007/8 company leakage will have to be measured as the residual of other inputs. In Table A2 total leakage, measured as a residual, is estimated as

1004Mld and this has been affected by changes in the estimates for PCC and unmeasured non households. Until accurate estimates for PCC and unmeasured non households are available leakage estimates based on the residual of other readings will be uncertain. While the actual estimate of the difference is inaccurate the scale of the difference is not surprising and confirms that DMA analysis cannot fully form the basis of leakage estimates at this time.

Scottish Water estimates service reservoir leakage at 11.62 Mld (13.45Mld last year), based on "Managing Leakage" default levels. The decrease is due to a reduction in service reservoir storage due to Scottish Water's rationalisation programme as well as better information on capacity following a major site survey programme (see our commentary on the improvements to the asset inventory. Measuring service reservoir leakage can be difficult if the service reservoir is not correctly valved and the valves are not in good condition. Nevertheless Scottish Water should be able to undertake some leakage measurements on a sample and opportunistic basis to check the current default value. This will become more important when Scottish Water is able to make a bottom up estimate of its leakage.

After a slow start in 2005/6 Scottish Water has significantly improved its leakage control efforts in 2006/7 by:

- Increasing its DMA coverage from 63% to 70% and finalising planning on all its proposed DMAs.
- Setting up an effective organisation to manage its leakage control. This work has yet to be completed but appointing leakage strategy and delivery managers, getting leakage analysts in place and training them as well as appointing some find teams is a good start.

Scottish Water intends to complete the organisation and staffing of its leakage control organisation by July 2007. Currently outstanding areas are completing the appointment and training of the find teams and finalising the organisation of fix teams.

Scottish Water is currently appointing consultants to prepare preliminary estimates of its economic level of leakage for the whole of Scotland by December 2007. For an accurate ELL It is important that costs of leakage control are known accurately and we recommend that Scottish Water reviews its current data capture systems with its consultants as soon as they are appointed. We note that corporate systems have been developed to capture leakage cost information. This must include information on which DMA each teams was working on in any day. It is only if this is done that accurate costs of sweeping DMAs can be estimated. In order to ensure that the time needed to implement changes to the corporate does not adversely impact its programme to December 2007 it may be necessary for Scottish Water to implement temporary and targeted paper based systems for the next few months.

We note that Scottish Water is trying to keep its DMAs under 3000 properties. Provided that the bulk of the DMAs are less than 2000 properties with multi-feeds also limited, this should allow Scottish Water to have an effective infrastructure to support its leakage control efforts. Scottish Water notes that in some areas DMAs will have to be greater than 3000 properties. This is accepted. In these areas we note that Scottish Water is proposing to trial aqualoggers and permaloggers. This is sensible.

It is also essential that that as part of its leakage organisation Scottish Water puts in place effective means to keep basic information on its DMAs up to date. As well as information on

properties and mains, the accurate logging of major commercial night use with good templates for smaller commercial properties is essential.

Because Scottish Water got off to a slow start with its leakage control activity it missed its leakage target in 2006/7. If it is to meet its target of 855 Mld for 2007/8 it is essential that all personnel are in place by July 2007 and that leakage control is energetically pursued. Even so it will be a very hard target for Scottish Water to achieve. In order to achieve the target Scottish Water will have to assess the practicability of implementing additional resources for backlog leakage removal. We understand that properly trained find teams are difficult to recruit and that new teams take time to train. We recommend that Scottish Water develops a practical programme of what it thinks can be achieved and if necessary enters into a dialogue with WIC.

Distribution system operational use (DSOU)

The total amount is made up of the same 6 items as last year. Expressed as a percentage of distribution input the percentage is the figure is generally lower than companies in England and Wales. This is to be expected given Scottish Water's high levels of leakage. Nevertheless we accept that the overall figure is likely to be comparable to other companies.

Scottish Water has estimated its distribution system operational use at 3.77 Mld, 1.64Mld lower than last year. A comparison of the two figures is shown in the table below:

Item	2005/6 value (Mld)	2006/7 value (Mld)
Reservoir cleaning	0.19	0.22
Planned flushing and swabbing	0.00	0.002
Burst repairs	0.32	0.6
Water quality (customers)	0.44	0.97
Water quality sampling		0.12
Mains rehabilitation and new mains	4.46	1.86
Total	5.41	3.77

Individually each item is scarcely material. The significant changes come from the reduction in flushing arising from mains rehabilitation and new mains work and small increases in water quality flushing at customers' taps and flushing at burst repairs. In all cases the changes arise from changes in numbers recorded on corporate systems and not from any changes in assumptions.

In order to arrive at its estimate of mains rehabilitation and new mains Scottish Water has made a number of assumptions regarding the length of mains drained and the volume of flushing water used. As noted in previous year's, we would like to see Scottish Water undertake a sample survey of flushing volumes by using metered hydrants to increase the reliability of this figure. Scottish Water has also made a number of assumptions when estimating water used for flushing following customer complaints of water quality. We would like to see these assumptions better substantiated by surveys of actual practice.

From our work in England and Wales we note that Scottish Water has generally included similar items to those estimated elsewhere. However, a number of items included under water taken legally unbilled may be included in this heading by other companies, which makes inter company comparisons difficult.

Water taken legally unbilled

This year Scottish Water has estimated this figure as 34.49 Mld a reduction of 0.94 Mld over last year's figure of 35.43 Mld. While generally water taken legally unbilled has been increasing in England and Wales as companies have been investigating their actual figures Scottish Water is now estimating a very much larger figure than the companies in England and Wales.

The differences between this year's and last year's figures are shown in the table below:

Item	**Estimated Consumption 2005/6 (Mld)**	**Estimated Consumption 2006/7 (Mld)**
Standpipe licences	21.36	16.1
Fire Service	11.82	13.1
WWTW Operations	1.81	3.98
SW Depots and offices	0.44	0.4
SW Jetting	0.01	0.99
Total	35.43	34.57

As for last year, this year Scottish Water has built up its figure using Company specific data under 5 basic headings.

We note that sewer cleaning, WWTW operations, Scottish Water depots and Scottish Water jetting have all been included in this heading. Elsewhere these may be included in distribution system operational use. The lack of definition as to what should be included under any heading makes inter company comparisons difficult and we would like to see Ofwat and WICS give additional guidance as to what should be included in Distribution System Operational use and what should be included in Water Taken Legally Unbilled.

The table shows that consumption from standpipe licences have decreased significantly this year. This decrease has been offset by increases in water used for firefighting, water used at WWTW and water used for Scottish Water sewer jetting. The most significant figure remains that for the Fire Service.

In the sections below we comment on a number of the more material estimates.

Standpipe licences

The main reason for the decrease this year is better information on the durations that standpipe licences run for (actual numbers of licences issued have hardly changed from an assumed 1048 last year to 1018 this year) and the reasons for the licence

being issued. This year Scottish Water has kept full records of its standpipes by category of use and length of time that the standpipe licence runs for. Our audit showed that these records have been used this year and have increased confidence in these aspects of the estimate.

As for last year water usage was estimated for approximately 50% of the licences issued with the other 50% assumed to consume the same average as those estimated, even though the usage may be very different. Even where the usage has been estimated the figures are very uncertain with significant assumptions being made (detailed in last year's report). Our experience of estimates from other companies is similar, and we acknowledge that estimates under this category will always be uncertain compared to some other categories. In previous years we recommended that Scottish Water should fit meters to its standpipes and undertake a number of sample surveys where appropriate to improve the accuracy of the estimate. This has not been done. Until it is done this section of the water balance will remain very uncertain, and Scottish Water no longer has the comfort provided by the fact that its estimate is similar to the water and sewerage companies in England and Wales.

Fire fighting

The volume for fire fighting has increased slightly from last year. Fire fighting remains a significant item. The estimate comprises two parts: use at fires (9.2 Mld compared to 7.9 Mld last year) and use for training (3.91 Mld compared to 3.91 Mld last year). The estimate is based on annual fire statistics produced by the Scottish Executive, which indicated a total of 46,971 incidents in 2006 compared to 46,933 incidents during 2005. This total is made up of a variety of primary fires (buildings and structures requiring 5 or more appliances) and secondary fires (outdoor, including grassland). Last year Scottish Water used an average rate of 25l/s for a fire flow (modern fire tenders apparently can deliver up to 50 l/s). Estimated times for hose use were obtained using input from the Lothian and Borders Fire Brigade. This year Scottish Water decided to use a figure of 33 l/s for primary fires on the basis that primary fires may use more water. We understand that different fire brigades have different policies on water use, some using water and others foam. We accept that Scottish Water has used data available to it but until water used per incident can be better estimated the figure will be subject to significant error.

Waste Water Treatment Plants

The amount estimated by Scottish Water has more than doubled from last year.

Scottish Water does not meter water use at its Waste Water Treatment Plants. As for last year the estimate for operational use at these sites is primarily based on an average use per population equivalent (p.e.), calculated from the metered consumption at the PFI sites. The change this year arises from 3 main reasons:

1. An average figure per p.e. rather than a median figure has been used.

2. 17 works have been metered and these have been included in the figures.

3. The total estimated p.e. for all Scottish Water's works has increased by 12% this year.

The results from the 17 works indicated a usage of 2.6 m^3/pe/yr compared to a figure of 0.19 m^3/pe/yr for the PFI works (0.175 m^3/pe/yr last year). The overall increase in the estimate from last year is significantly influenced by the inclusion of the metered works.

We have not audited this figure in any detail this year. Whilst accepting that the PFI sites tend to be medium to large works and so could underestimate water usage it is concerning that the metered sites (17 no) give figures that are so much larger. We suggest that Scottish Water increases the current sample to cover a range of works types and sizes. In addition Scottish Water should carefully investigate how the water is being used and why there is such a large difference between its sites and the PFI sites.

Our overall conclusion is that while Scottish Water has tried to make a proper estimate of its water taken legally unbilled many assumptions have been made with little supporting information. The resulting figure is large and is now an outlier compared to companies in England and Wales, although we acknowledge that it is difficult to estimate the figure with any accuracy and different companies may put different items in the categories of distribution system operational use and water taken legally unbilled. We believe that a series of sample surveys using metered supplies would enable Scottish Water to significantly improve the confidence in its estimate.

Water taken illegally unbilled

As for last year Scottish Water has estimated illegal use under three categories as shown in the table below:

Item	**Estimated Consumption 2005/6 (Mld)**	**Estimated Consumption 2006/7 (Mld)**
Occupied voids	0.87	0.88
Illegal standpipes	3.17	3.85
Fire hydrant misuse	0.38	0.67
Total	4.42	5.4

These categories are what we would expect to see under this heading and have marginally increased since last year.

The largest volume is that for illegal standpipes. Last year Scottish Water assumed that 25% of standpipes in this category were illegal. This year the estimated number comes from the standpipe administrator and has been based on reports from operational staff, who receive a bonus for every one that is detected and subsequently registered and paid for by the user. While the estimated numbers of illegal standpipes are now more accurate the volume used per standpipe is the same as last year and remains very uncertain.

For voids, Scottish Water has assumed that 5% will be occupied. As we have already stated the system in Scotland is such that occupied voids are likely to be significantly lower than in

England and Wales. Domestic voids in Scotland are reported as 2.5% of total domestic properties. This is similar to figures in England and Wales where voids are closely monitored. We believe that in choosing 5% as the figure for occupied voids in Scotland, Scottish Water has made a reasonable assumption. There is little change from last year.

The estimate for fire hydrant misuse is based on recorded numbers of vandalised fire hydrants with assumed flow rates and run times. The figure is hardly material but should be regarded as uncertain.

Distribution input

This has been measured from returns completed by production staff who read the bulk meters at water treatment works. For the larger works readings are taken on a weekly basis. For smaller works readings can be taken monthly. While there are large numbers of monthly reads, approximately 87% of the DI comes from weekly read meters.

For this year's return, production staff again sent their readings to a single co-ordinator who summarised the readings on a central spreadsheet. Occasionally returns are missed due to inoperable meters or for other reasons. When this happens estimates are entered either by the co-ordinator or production staff. Estimated readings are shown in another colour and are easily identifiable. Estimated readings are usually based on the nearest actual reading. Following our recommendations last year Scottish Water now adjusts estimates for seasonal variations based on the previous year's variation.

We believe that DI has been conscientiously prepared but clearly the number of people involved and the fact that direct downloads of telemetered data do not form part of the system reduces the confidence in the result. In previous years Scottish Water reported that it plans to implement a database system for future years but, to our knowledge, no progress has been made. A database should improve the accuracy of the data provided that:

- Telemetered information is downloaded directly to the database whenever possible.
- Written procedures are prepared for production staff, impressing on them the need for accurate and timely returns.
- The co-ordinator sees the final WIC table to ensure that the DI line accords with his knowledge.

Scottish Water reports that several projects are underway with the objective of improving the accuracy of its DI estimate. We understand that Scottish Water has a three phase programme to validate its DI meters:

Phase 1: Validate 68 meters at the top 27 sites.

Phase2: Validate meters at medium sized works.

Phase 3: Validate meters at small works.

This programme has been planned for a number of years now, and based on our experience elsewhere, it is important that DI meters are validated as many have been found to have significant errors.

When replacing or recalibrating meters it is important that Scottish Water also reviews the location of the meter to ensure that the correct hydraulic conditions apply for accurate measurement.

Sewage volumes and loads

Sewage Volumes

Sewage volumes are calculated as 0.95 times the water consumption. The forecast plus 1 figure is calculated from the projection for unmeasured domestic properties.

Details of the individual calculations are described in our commentaries by line below.

Sewage Loads

The estimated total load discharged to sewer in the year is broken down by key components as follows.

Component	Load in tonnes BOD/yr	
	2005-06	2006-07
Resident population	104,654	103,033
Non-resident population	2,623	2,113
Non-domestic load	18,347	19,572
Trade effluent	36,882	32,074
Other including tanker loads and liquor returns	1,853	1,740
Total	164,358	158,532

We note that there is an error in the reported loads for non-households in lines A.48 and A.49. The data entries were mistyped resulting in loads which are low by a factor of 1000. This has a consequential impact on the total load calculated in line A2.50 which is 15% lower than in previous years. The company has confirmed that revised figures have been submitted. Much of the real reduction in estimated load of 3.5% from the previous year can be explained by a reduction in trade effluent loads.

The total load reported in line A2.55 includes loads discharged to PPP works (identified separately in line A2.60). The load reported in line A4.34 of the 2005-06 annual return excluded the load discharged to PPP works.

Scottish Water has undertaken a review of sewage loads in the report year taking account of changes to population, trade effluent and other discharges in the report year. The methodology adopted by the company is the same as in previous years. The key components of the load analysis are as follows:

- Resident population data is derived from the total connected domestic population. The connected population has been distributed to individual works by address point count within drainage area boundaries. Population was distributed on the basis of occupancy levels estimated for each council area and the estimated populations adjusted to reconcile with the estimated connected population in each council area.

- Non resident population was assessed from visitor numbers produced by Visit Scotland. The visitor population was distributed over visitor accommodation identified by mapping Yellow Point data to drainage area boundaries. This introduces two possible errors at individual works:

    - mapped drainage area boundaries may not be detailed enough to pick up major holiday accommodation sites; and,

    - the bed space at an individual property could be significantly different from the average.

    While the quality of the allocation to individual works may be poor, the overall assessment remains reasonable. Non-resident population represents an estimated 1.3% of the total load discharged to sewer (including PPP works).

- Measured and unmeasured non-domestic loads are calculated from the measured or estimated volume of wastewater discharged assuming a BOD concentration of 300 mg/l. Scottish Water has spatially referenced each discharge and mapped the volumes to individual catchments. This process has improved confidence in the allocation to individual works. Inaccuracies in the definition of drainage area boundaries or the spatial referencing of individual discharges results in some discharges being mapped outside the catchment boundaries. The accuracy of the allocation of loads to individual works might be poor because:

    - the volume of discharge to the sewer from unmeasured properties is based on rateable value.

    - the corresponding loads are determined by assuming a concentration of 300mgBOD/litre, which is based on typical sample results.

    We recommend that Scottish Water considers further sampling to provide a more robust estimate of non-domestic loads. We note that some non-domestic properties will be visitor accommodation serving non-resident population. This introduces a potential double count between the non-domestic and non-resident loads. Non-domestic load represents an estimated 11% of the total load discharged to sewer.

- Trade effluent loads have been taken from Scottish Water's corporate trade effluent records. Separate assessments are made of BOD load and COD load based on sample test results. The reported quantities are based on COD measurements taken from detailed records of individual customers that form the basis of trade effluent charges Scottish Water has carried out some sampling and from the results it has determined a conversion factor of 1.482 to convert settled BOD and COD to unsettled concentrations. The daily trade effluent load is the annual load averaged over 365 days. In some catchments trade effluent may be discharged over a

working week or be subject to seasonal peaks, resulting in a higher daily load on individual treatment works than the reported average implies. Trade effluent represents an estimated 20% of the total load discharged to sewer (including PPP works). Trade effluent loads are based on the measured volumes and measured concentrations in the report year. This differs from the approach used for trade effluent billing where the billed load is based on the measured volume in the report year and the average concentrations in the prior calendar year.

- Tanker loads have been included under the following categories
    - Imported private septic tanks.
    - Imported public septic tanks.
    - Imported other tanker loads.
    - Imported WTW sludge.
    - Sludge liquors arising from imported sludge.

    Total tanker and other loads represent an estimated 1.1% of the total load discharged to sewer (including PPP works).

    Volumes are based on specific records of imports and a combination of logged volumes or nominal volumes where discharge loggers are not available. Septic tank volumes have been converted to a load by applying a standard concentration of 6000 mg/l BOD based on previous measurements.

Scottish Water has compiled a spreadsheet that holds data on all treated and untreated continuous discharges. It also contains data for operational and non-operational assets and PFI works. Data on discharges were initially compiled from legacy systems of the three predecessor authorities. The list of works and discharges is continually reviewed by asset planners to ensure that it is updated to correct errors in historic data and take account of improvements in the year. The works reported in Table E8 are those in operation at the end of the report year and do not include PFI works.

The sewage loads reported in this table are generally the same as those used for tables E8, E9 and E10.

Sewage sludge disposal

The reported sludge quantity is the total quantity disposed of including the sludge disposed of from PPP works which is reported separately in Table E3. This differs from the approach adopted in the previous return when reported sludge quantity in the equivalent line in table A4 (line 52) excluded sludge disposed of from PPP sites

The quantity of sludge disposed of in 2006-07 is allocated between Scottish Water and PPP concessions as follows:

SW sludge disposal	21.824	ttds
Table E3 – PPP sludge disposal	101.735	ttds
Total sludge disposal 2006-07 (table A2)	123.559	ttds

The quantity of sludge and sludge disposal costs reported in table E10 are limited to the Scottish Water's direct sludge disposal and excludes disposal from PPP works. The quantities in table E10 are consistent with quantities in table A2.

The reported sludge quantity is an estimate of the quantity produced prior to treatment. The quantity of sludge disposed of may be significantly less due to the conversion of organic solids to gas in the treatment process. This is done to maintain consistency with reporting requirements for June Returns in England and Wales (see Ofwat June Return Reporting Requirements definition for table 17g line 2).

The main treatment processes adopted in Scotland (including PFI works) are digestion, enhanced digestion and drying. Scottish Water has assumed that the loss or conversion of solids in these processes are 35%, 55% and 5% respectively. These quantities have not been justified by measurement. We believe that they are at the upper range of likely values.

In previous years the company has relied on combination of measured and theoretical figures to estimate sludge quantities. In the report year the company has relied almost exclusively on measured sludge data with the exception of two works where full measured data was not available and a theoretical estimate was applied.

The measurements maintained by Scottish Water are detailed records of individual loads. Sample checks are carried out against waste transfer notes where possible to confirm that complete data is being captured. Either all or sample loads are subject to weighbridge checks to confirm the tankered volume. Sludge thickness is measured on a sample basis. The records reviewed in audit indicated that sludge thicknesses were consistent over a period of time and averages used are representative. In some cases the averages were calculated over a number of years rather than being limited to the report year. We suggest that this is reviewed to ensure that any real changes in solids content due to improved operational practice or new plant are not overwritten by historic average data.

The equivalent sludge quantities reported in England and Wales (June Return table 15 and 17g) may include grit and screenings. Companies are required to provide an explanation of their approach to Ofwat. Scottish Water has not included grit and screenings in the sludge quantities reported in table A2 or E10. We note the need to consider this difference of approach in any econometric analysis based on reported data from England and Wales.

The variation in reported sludge quantity figures for the last four years is:

	2003-04	**2004-05**	**2005-06**	**2006-07**	
SW sludge disposal		29.183	26.775	21.824	ttds
PPP sludge disposal		114.126	113.411	101.735	ttds
Total sludge disposal	112.525	143.309	140.186	123.559	ttds

The 2003-04 return did not require separate PPP sludge quantities in table E3.

The increase in total quantity from 2003-04 to 2004-05 is due to a change in methodology. In 2003-04 sludge quantities were reported net of losses in treatment such as digestion. From 2004-05 onwards the estimated quantities of raw sludge included an allowance for losses in treatment.

There has been a marked reduction in the quantity of sludge reported in 2006-07. This appears to have been a consistent change across PPP and SW disposal outlets. In discussion, Scottish Water identified a number of possible reasons for these changes but it was not possible to establish a definitive explanation for the change. Potential reasons for the reduction in sludge quantity include:

- Rainfall patterns in the report year with more wastewater spilled to overflows than in previous years. While we recognise that this is possible, no specific and quantifiable impact was identified.

- Changes to loads to treatment resulting in a reduction in sludge production. There have been no material changes in resident population. There has been a general reduction in trade effluent loads. However, the overall reduction in estimated load is not sufficient to explain the reduction in sludge quantity. It is possible that some reduction in trade effluent will have a significantly greater impact on sludge production than the reduction in COD load might imply.

- Scottish Water has replaced estimated loads for a number of works with measured loads. In one instance there has been a significant reduction in sludge quantity. We suggest that Scottish Water continues to review sludge production against works load and identify and seek to explain areas where there are significant differences.

- There may be differences in the quantities of sludge in store at the end of the report year. During our audits, Scottish Water noted that it did not believe that this would have any material impact on sludge quantities disposed of in the report year.

Satisfactory sludge deposal

In the report year sludge was disposed of to the following outlets:

Outlet	Scottish Water	PPP (STWs)	PPP (Daldowie)
Agriculture	Y	Y	
Land reclamation	Y	Y	
Landfill	Y	m	m
Compost	Y		
Incineration		m	Y
m = minor outlet used to provide security to other main outlets Incineration of sludge from Daldowie is at Longannet Power Station to recover energy			

The management of satisfactory disposal of sewage sludge from the PPP outlets is the responsibility of the PPP concessionaire. Scottish Water maintains waste transfer records for sludge transferred to the PPP sewage treatment works for treatment and disposal.

Sludge from Scottish Water and PPP treatment works in the Greater Glasgow area is transferred to the PPP sludge treatment centre at Daldowie through a sludge pumping system. One stage of the pumping system is operated as part of the Daldowie PPP sludge treatment concession. Scottish Water monitors the transfer of sludge to the treatment centre through flow-meters along the sludge pipeline. Scottish Water relies on the PPP concessionaire's records of waste transfer of treated sludge from the Daldowie sludge treatment centre for disposal by the PPP concessionaire.

The use of treated sludge from Daldowie as a fuel at Longannet Power Station was challenged by SEPA. The PPP concessionaire has given undertakings to provide alternative combustion facilities for sludge from Daldowie. Scottish Water is monitoring progress on the development of these facilities.

Scottish Water assesses and monitors reuse of sludge in agriculture through its Gemini system to demonstrate compliance with the sludge use in agriculture regulations and the associated codes of practice. Supporting information is provided to farmers to demonstrate beneficial use and note any cropping or land use regulations. Scottish Water also maintains the HACCP plans and sludge monitoring required to discharge the non-statutory requirements of the "Safe Sludge Matrix".

Scottish Water monitors disposal of sludge to land reclamation through waste transfer notes. Checks are carried out on the waste carriers and the land reclamation operation including the availability of waste management exception certificates. Audits have been carried out by Scottish Water staff at the land reclamation sites to check that sludge disposal operations are compliant.

Scottish Water monitors disposal of sludge to landfill through waste transfer notes. Checks are carried out on the waste carriers and landfill sites. Sample audits are carried out to reference records of waste received at the landfill sites with the waste transfer notes issued by Scottish Water.

We understand that sludge composting is limited to activities at one landfill site with the composted sludge disposed of to landfill including landfill capping and restoration. Scottish Water monitors disposal of waste to composting through waste transfer notes and checks on waste carriers and the end disposal operation.

We understand that Scottish Water's records of sludge disposals to agriculture and waste transfer are subject to checks and audit by SEPA but that none were carried out for the Report year.

We believe that the records maintained and checks undertaken by Scottish Water are adequate to report 100% satisfactory sludge disposal. We recommend that Scottish Water confirms with SEPA that its internal records of sludge transfer to the PPP concession at Daldowie supported by the PPP concessions waste transfer notes fully discharges Scottish Water's duty of care for the waste.

Comments by Line

Populations

Lines 1: The winter population is reported as 4,954,732, which is an increase of approximately 0.2% from the previous return, and is just under that projected for this report year in the previous return.

Line 2: The summer population is the winter population plus the tourist population from the peak month for properties connected to the water service. The value in the current return is approximately 0.5% greater than that in the previous return. It is higher by approximately 0.3% than that projected in the previous return for this year.

Line 3: The population of unmeasured household properties is calculated by multiplying the number of households with water by the SW calculated occupancy rate and is reported as 4,867, 579 which is an increase of approximately 0.6% from the previous return.

Line 4: The population of measured households is calculated from the number of measured domestic properties from High Affinity multiplied by the occupancy rate. The figure reported this year is 1292 which is an increase of approx 23% from the previous return.

Line 5: This is the sum of lines 3 and 4.

Line 6 and 7: These are returned as the same as Lines 1 and 2.

Line 8: Household population connected to the wastewater service (measured and unmeasured) is reported as 4,707,803 which is an increase of approximately 0.6% from the previous return, and slightly higher than that projected in the previous return. The figure include for the population for measured waste.

Line 9: The assumed percentage returned to sewer is 95%, which SW has stated as the industry standard.

Water balance

Lines 10 & 11 Scottish Water does not have any bulk imports or exports. Distribution input is measured by Scottish Water's bulk meters. Subject to meter under-registration it should be fairly accurate. Scottish Water intends to improve reporting of its distribution input by implementing a programme of meter replacement and calibration. Projected increases for next year assumes that WIC leakage target of 855 Mld will be met.

Lines 12 & 25: Unmeasured domestic water delivered has significantly increased over last year's return. This is primarily due to the re-estimate of PCC as we describe above. Estimates of unmeasured PCC should be improved next year if Scottish Water implements its new PCC monitor to programme.

Lines 13 & 26: Scottish Water has very few domestic metered properties. We note that estimated per capita consumption is higher than the unmeasured PCC but understand that properties in this group are often farms or cottage complexes.

We note that the number of domestic metered properties has increased this year. Scottish Water reports that this is due to a data cleansing exercise that has been carried out for the split between Scottish Water and Scottish Water Business Stream.

Line14 &24: Measured non-domestic consumption comes from meter readings and should be accurate subject to a possible small bias due to estimating consumption to the year end from the last meter reading. Meter under-registration is based on the average of other companies published figures. While probably reasonable these may not fully reflect the situation in Scottish Water. Average consumptions have increased marginally since last year (2.3%). Projections assume that there will be an addition of 500 measured non households next year. Scottish Water plans to meter many unmeasured non households next year but they will remain on the unmetered tariff until 2010 unless they opt for the measured supply. If many do opt the 500 may prove to be low. For further information on property numbers see our narrative in Table A1. We believe that Line 15 is inconsistent with Line P4.29.

Lines 14 &23: The consumption of unmeasured non-domestic properties has significantly increased this year due to a revised estimating method (see our narrative above). Scottish Water assumes that there will be no change next year (see our comments against line 2.14 above). Estimates next year should be much improved if Scottish Water implements its planned metering programme.

Lines 17 &29-31: Water taken unbilled has marginally decreased since last year for the reasons given in our narrative on methodology. Scottish Water is not estimating that there will be any change next year.

Line 18 & 30: Calculated as the difference between distribution input and other inputs to the water balance. Overall leakage, including supply pipe leakage, is reported as reducing by approximately 100 Mld this year of which approximately 57 Mld can be attributed to changes in methodology for calculating unmeasured PCC and unmeasured non households. Scottish Water is projecting that it will meet its target of overall leakage target of 885 Mld in this financial your. This will be a demanding.

Line 20: This value has marginally increased since last year, largely due to a new user. One large user is estimated to consume 4.5 Mld but is unmetered. This leads to some uncertainty in the figures.

Lines 31 - 36: Based on measured flow rates from a sample of 40 supply pipes. We recommend that Scottish Water continues to extend the sample. Background leakage comes from the "Managing Leakage Report. Given the assumptions in the figures they should be regarded as uncertain as

they are at other water companies. The figure is larger than current estimates in England and Wales and is expected to fall as Scottish Water's active leakage control operations are improved and extended.

Lines 35 & 38: These are estimated figures based on industry averages.

Sewage volumes

Line 39: The unmeasured sewage volume has increased from 618 Mld in 2005-06 to 661 Mld in the report year. The value is calculated from the connected resident population multiplied by the per capita consumption (pcc) for un-measured domestic properties of 147.7 l/c/d. A 95% return to sewer is assumed. The increased return to sewer relates to the increase in pcc from 139.1 l/h/d in 2005-06 (see commentary on the water balance above). The pcc used in the calculation excludes plumbing losses. Some plumbing losses may be returned to sewer.

Line 40: The measured domestic sewage volume is taken from the Hi Affinity database.

Line 41-42: The volumes of unmeasured and measured non-household volumes are taken from the Hi Affinity database.

The report is based on meter readings. Different methods are used to infill volumes between the start of the report year and the first meter reading and between the final meter reading and year end. The impact of these different assumptions have not been tested by the company.

Line 43: The volume of trade effluent is greater than the volume reported in the P tables for trade effluent billed. The figure in table A2 is based on the sum of average daily volumes for each trade effluent discharge. The daily averages are calculated over the number of days a discharge occurs in the year. The sum of these average volumes is higher than the average of the total volume discharged over a year. The calculation also impacts on the calculation of trade effluent loads discharged to sewage treatment works.

Sewage Loads

Lines 46 to 59: The reported data refers to all loads discharged to sewer including that treated in PPP plant. In previous returns the equivalent data excluded loads treated by PPP works.

Lines 46: This is an estimate of the loads for resident domestic population. It is calculated from the connected population in line A2.8 less measured household population. It excludes non-resident population loads. Resident population is converted to load assuming a per capita discharge of 60 g.BOD/day.

Line 47: This is an estimate of the loads for resident population in properties with a measured water supply. The population is materially less than that in line A2.4. The company's records indicate that only 37% of properties with a measured water supply are connected to the sewerage service. The low connection rate reflects the type of larger remote properties which might opt for a measured water supply.

Line 48: The unmeasured non-household load is calculated from the estimated volume of water from this type of supply (line A2.41) multiplied by 300 mg.BOD/l. There is an error in the data entry and the company has confirmed that the correct figures is 4955 tonnes.BOD/a.

Line 49: The measured non-household load is calculated from the estimate volume of water from this type of supply (line A2.42) multiplied by 300 mg.BOD/l. There is an error in the data entry and the company has confirmed that the correct figures is 14550 tonnes.BOD/a.

Line 50: The trade effluent load is derived from individual billing records which are linked to treatment works. There has been a reduction in the estimated trade effluent load in the report year of 15% which is the major component of the overall reduction in load in the report year of 3.5%.

Line 51: The total discharged from primary services is calculated from lines 46 to 50 above. On this basis, the reported figure excludes load from non-resident population (see line 46) and incorporates the errors in reported data in lines 48 and 49.

Line 52 to 54: We note that tanker volumes have increased from the previous year. Scottish Water attributes this to reduced activity in the previous year. This is consistent with the increased number of septic tanks emptied in the report year.

Line 55: This is the sum of lines 51 to 54. It incorporates the errors noted in lines 48 and 49. It excludes loads from non-resident population which are not included in line 46. It excludes load from sludge imports which are not included in lines 52 to 54.

Lines 56 & 57: The average COD and suspended solid figures are reported as 350mg/l and 250mg/l respectively. They are the nominal values used for determining trade effluent changes. These are unchanged from the previous return. The forecast figures are the same as that for 2006-07.

Line 58 & 59: We confirm that the reported population equivalent excludes non-resident population. The reported equivalent population at works with numerical consents includes works with single and two tier consents and works with a descriptive consent with a numeric backstop parameter values.

Line 60: Loads from PFI works, the figure is taken from the works loads spreadsheet. The loads reflect Scottish Water's estimate and are not subject to the errors or exclusions identified for line 55.

Lines 61-62 The methodology for estimating sludge quantities, the reduction in reported sludge quantity from the previous year and the management of sludge disposal are described in the section on methodology above.

Comments by Confidence Grade

Subject to the comments below we accept Scottish Water's confidence grades.

Lines 1-19: We accept the grades proposed

Line 11: Scottish Water reports a confidence grade of C4 because of the closing error with the other inputs. However, distribution input should be one of the most accurate inputs into the water balance. We therefore suggest that a C2 grade could be considered for this line.

Lines 12, 25: Based on old data and extrapolated using a sample of 3 WASCS in England and Wales. Given the extrapolation we accept the C4 grade submitted by the company.

Line 14, .23: Scottish Water reports a confidence grade of C4 for its unmeasured non household consumption. We believe that this is reasonable.

Line 18, 31-36: WIC guidance indicates that a reliability grade D is given if leakage is estimated as the residual of the water balance. We believe that this is the case and hence a reliability band of D is appropriate. Scottish Water has estimated its leakage from its DMA calculations but as the closing error is so great we do not believe that this should be used as the basis of assigning a C grade. The 4 accuracy grade is accepted.

Line 19: The reported confidence grade for the overall water balance is accepted.

Lines 39 to 45 We believe that the confidence grades reported for sewage volumes are reasonable with the following exceptions:

- The unmeasured household volume is based on the estimated pcc which has a C4 confidence grade. We suggest a C4 confidence grade for the reported volume.
- The unmeasured non-household volume is based on rateable value. We suggest a B3 confidence grade for the reported volume.
- Based on the unmeasured non-household volume, we suggest a C4 confidence grade for the total volume in line 44.

Lines 46 to 60: We believe that the confidence grades associated with sewage loads are reasonable with the following exceptions:

- We suggest a B4 confidence grade for line 47 to reflect uncertainties over the resident population in a small sample of properties.

- We suggest a B4 confidence grade for un-non-household loads to reflect uncertainty in the assumed concentration used to estimate the load.

- We suggest a confidence grade of B5 on tanker loads to reflect the use of historic average concentrations to estimate loads and uncertainty over volumes.

Line 61: We believe that the reported confidence grade for sludge disposal is reasonable. We note that the variation in total sludge quantity from the previous year, allowing for known changes in load, is on the limit of the stated accuracy band.

Line 62: We believe that the confidence grade for percent unsatisfactory sludge disposal is reasonable.

5. SECTION B: OUTPUTS TO CUSTOMERS

5.1 Overview

Scottish Water has completed tables B1 to B7 with commentary on outputs to customers.

Our individual table reports include detailed commentary on the return. Overall, the key points arising from the audit are:

- Scottish Water has not imposed any restrictions on water use in the reporting year.
- For the reporting year Scottish Water's old low pressure register was used to provide the figures. During the year Scottish Water has carried out a data cleansing exercise and has rolled out a new corporate register which went live in February 2007. This is a significant improvement in its low pressure recording. The data cleansing exercise has resulted in the removal and addition of significant numbers of properties in the register. All properties which have been confirmed as suffering low pressure are in the process of being added to the new register. The old register has been updated with the removals and additions due to this better information and Scottish Water now has improved confidence in its data.
- For flooding incidents Scottish Water has recognised that the reliance on historic reports and the migration of data between systems means that audit trails are not always available to support the inclusion of properties on the at risk register. To address this, over 6000 customer surveys were undertaken to provide confirmation of flooding incidents. Including this data in the flooding register will improve the reliability of the data but to date only a portion of this data has been reviewed and updates added to the register. Within individual new records there are significant areas of missing data. Scottish Water has therefore adjusted the table entries to allow for the missing data. For this reason we believe that a confidence grade of B4 is appropriate.
- Customer information in Tables B4 to B7 has been taken from Scottish Water's customer contact and billings systems. This has allowed reliable information to be produced. However, Scottish Water continues to have difficulty in accurately allocating GMS payments to categories in Table B7.
- Sewer collapses currently include pumping main failures. It is our view that pumping main failures should be reported separately from sewer collapses as sewers and rising mains exhibit very different characteristics.
- We believe that it would be useful for data on laterals to be included in a separate table to enable an easier comparison of Scottish Water's performance with water companies in England and Wales.
- Equipment failures include failures at sewage treatment works. The company has not applied any materiality limit to the equipment failures report. The report includes failures which might not have had a detrimental impact on customers or the environment.

- The company has complied with the detailed analysis set out in the reporting requirements to calculate sewage treatment works performance. We note that the measure adopted might not fully reflect the impact of investment over time.

- Scottish Water has prepared a "Security of Supply Index for the first time this year. We believe that the information presented by Scottish Water in Table B9 gives a reasonable representation of the resource situation in Scotland under current and proposed legislation but more development is required. While likely reductions in abstractions under the Water Framework Directive have been taken into account in the analysis, further changes are possible as SEPA agrees final licences over the next two years.

- Scottish Water is currently working closely with SEPA to develop the full water resource plans by April 2008, which should further improve the accuracy of the information reported in Table B9. Scottish Water produced its first Water Resource Plan (WRP) in April 2006 based on methodologies agreed with SEPA. The 2007 water resource plan updates the 2006 plan but emphasises Scottish Water's work to produce robust water resource plans in April 2008.

- While SEPA has agreed Scottish Water's levels of service for resource development the Scottish Executive has yet to formally agree them.

- Even though Scottish Water has not produced water resource plans to the current level expected in England and Wales we believe that it has generally been developing its resource strategy in a well planned way, using industry standard methods, particularly for deployable output.

5.2 Table B1: Restrictions on Water Use

Commentary by REPORTER

Scottish Water reports that it has not imposed any restrictions on water use in the reporting year. This is accepted.

5.3 Table B2: Pressure and Interruptions

Commentary by REPORTER

5.3.1 Lines B2.1 to B2.10 – Properties receiving pressure/flow below reference level

Introduction

Key Points

- The number of properties at risk of low pressure has decreased in the report year from 12995 to 7772. The main movements are additions due to better information (1727) and removals due to better information (6776). 120 were removed due to operational changes and 163 due to asset improvement. 109 properties were added to the at risk category due to operational changes or asset deterioration.

- The low pressure register, which was used for the current report year, holds numbers of properties at risk by Water Supply Zone and does not identify individual properties at risk. This register does not comply with the WIC requirements in a number of areas, the prime one being the fact that it does not list properties affected. However, Scottish Water has carried out a data cleansing exercise over the last year and has rolled out a new corporate register which went live in February 2007. The data cleansing exercise has resulted in the removal and addition of significant numbers of properties in the register. All properties which have been confirmed as suffering low pressure are in the process of being added to the new register. The old register has been updated with the removals and additions due to this better information and Scottish Water now has improved confidence in its data. A version of the new corporate register was demonstrated at the audit.

- The surrogate reference level of 15m at the distribution main has been used to check for low pressure. No allowance has been made for properties with longer service pipes, or for multiple properties served from a common service pipe.

- The register of properties at risk was originally developed from registers in the three former authorities. The information was gathered from a number of sources and the data appears to be of variable quality. As discussed above, a data cleansing process was carried out in the report year. Phase 1 looked at 50 WSZs which contained around 8000 DG2 properties; Phase 2 looked at 100 WZS which contained around 3000 DG2 properties. This process, which covered about 84% of the total on the register, confirmed those properties which did actually suffer low pressure. This resulted in a large number of properties being removed. The other 16% of properties were not reviewed as they were scattered over 400 WSZ and Scottish Water did not consider that it was cost effective to survey them. We looked at a small number of sample survey results and the removals and additions were properly justified. The survey did not specifically look for areas where there may be unrecorded properties suffering from low pressure but started on the basis that most properties suffering from low pressure would have been in the surveyed zones.

- The DMA installation programme is an excellent way for Scottish Water to check for low pressure areas. Scottish Water confirms that pressure checks are carried out

when a new DMA is set up and if the pressure is low checks for low pressure failures are made. This means that as the DMA programme is finalised all of Scottish Water's significant low pressure areas should have been identified.

- Scottish Water has suggested that there are around 1000 properties which are near service reservoirs where the required service level cannot be met. These have been stated in its commentary, as is the practice in England and Wales.

Comments on Methodology

The low pressure register, used to produce the Table B figures for this report year, is a spreadsheet that holds numbers of properties at risk by Water Supply Zone. The register does not comply with the WIC requirements as addresses, causes and details of the incidents or actions to resolve problems are not stored. There is no named person listed and only some methods of assessment are listed.

Scottish Water is currently in the process of rolling out a new register which was pilot tested in one operational area in the previous report year, and has been operating for the whole of Scotland since February 2007. At the audit this register was reviewed. It contains records of low pressure properties and can store information from the initial complaint, through investigations and final solution of the problem. The process of getting data onto this register is not automated and still relies on completion of paper forms by staff in the field. A process to be followed has been set up and training of staff has been carried out. Handhelds and the IMS system are not yet in operation for low pressure properties, although this may be considered by Scottish Water in the future.

In this report year, a data cleansing exercise has been carried out, but not all the data has been entered into the new corporate register and it was not used for this year's annual return. Data which was entered into the new register in February and March has also been entered on the original spreadsheet register and this has been used for the return. The new register is a significant improvement on the previous methodology for the low pressure register and it will be the single source of data for low pressure properties from this year onwards.

The data cleansing exercise was carried out by RPS on behalf of Scottish Water. Fifty WSZs were looked at in detail in June to October 2006, and a further 100 in January to March. Detailed logging was carried out over a two week period in each WSZ. Corporate GIS data was used along with digital terrain mapping to determine if properties suffered low pressure during the survey period. The pressure logger measured pressure during the survey, the minimum pressure was noted and a calculation was carried out using the digital terrain model to calculate the pressure at each property which had been assigned to that logger. Any properties which had a pressure less than 15m were considered to have a problem. The reports from this study were used to add and remove properties from the spreadsheet register. The property tap pressures were not checked as part of the study. Any properties that were deemed to have a problem were then entered onto the new corporate register with their full address details. This data entering is still ongoing. In addition to the detailed logging studies, a desktop study was carried out to determine addresses for the remaining approx 2000 properties which had not been proven by study. It is Scottish Water's intention to enter these as low risk properties to be confirmed or removed by later study. This clearly will be an area of uncertainty in the new register. Data also enters and leaves the register due to operational

maintenance studies, leakage strategy work, business development department work and ad hoc operational logging.

A surrogate reference level of 15m at the boundary/distribution main has been used. No allowance has been made for properties with communication pipes which are long or in poor condition. No allowance has been made for multiple properties fed from a common service. The register used for this report year does not identify whether a property has a long communication pipe or is one of a number of properties served from a common service. We recommend that this is an issue which should be looked at in the new corporate register. We understand that Scottish Water is aware that this is an area still to be developed in the new register.

There are 23 exclusions reported. Scottish Water has detailed these from the new corporate register. Scottish Water currently has no method of capturing the transient events which could lead to low pressure events being excluded from the register.

Historically there has been no method by which a customer contact or complaint will generate an entry on the database; nor is information relating to operational investigation of customer complaints recorded. We understand that with the new corporate register a complaint will only appear on the register if it is confirmed by a NSO to be a low pressure problem which Scottish Water are responsible for. It is recommended that the register should include all properties where a complaint has been received with a clear reason given why the property is considered to be at risk or not at risk of low pressure.

No specific investigations are undertaken to identify whether emerging properties should be attributed to asset deterioration. Additional properties found to be at risk of low pressure are all attributed to "better information". There are no assessments carried out to confirm that properties removed from the register do not suffer further low pressure during periods of high demand, although Scottish Water has stated that the new corporate register does contain a review box for this purpose in the future. We believe that this is an important aspect of effective low pressure management and suggest that Scottish Water sets up a procedure whereby all low pressure clusters are revisited in the next period of high demand to check that pressures remain adequate.

During the audit we asked to review six examples of supporting information which led to changes to the register.

- We were unable to view the information provided for one sample.
- Numbers were provided to back up an addition due to asset deterioration, but the information provided was a logging report – which would lead to the conclusion that better information was possibly the reason for addition to the register.
- One sample was for properties added due to better information, a logging report with background plans was supplied and the data tallied with the register.
- .Samples were provided to back up additions due to asset improvement, better information and removals due to operational change. The source of the report text was uncertain.

We suggest that Scottish Water sets up a robust system of auditable supporting information, to be kept in the relevant office. This should comprise a signed off and dated sheet from the investigating person, pressure logging results before and after any remedial action, together with a map showing the number of properties affected. The map should show the position of the logger and the pressure recorded, the resulting 15m pressure contour and the properties affected. If Scottish Water's GIS has information on common communication pipes then we suggest that these are shown, including those immediately adjacent to the 15 m contour. Rules on likely pressure drops in shared connections should be developed to allow these properties to be categorised as likely to be suffering low pressure or not.

We understand that no DMA reports were carried out in the report year and that the bulk of data on and off the register has been due to the detailed logging studies which were carried out due to the OPA action plan. We recommend that more work be carried out to confirm whether or not the 2000 properties whose addresses only will be determined can be confirmed or removed from the register.

We believe that the work carried out by Scottish Water represents a significant step forward in its DG2 register. We believe that the original data was likely to be inaccurate and the new numbers are likely to be more accurate. Given the data cleansing has covered the majority of previously identified low pressure areas we believe that B3 is a reasonable confidence grade for the data.

It must be recognised that, of those still on the register, there are still a significant number where it has not been confirmed whether they should appear or not, and their exact addresses are not known. There are also WSZs where no problems are anticipated or the existing numbers on the register are small and where no sampling has been carried out. Some additional problems may emerge in these areas. Until all areas have been pressure logged uncertainty will remain. Pressure checks during the implementation of the DMA programme should help in this regard.

We recommend that Scottish Water carries out the following:

- Low pressure complaints are regularly investigated and if appropriate properties are added to the database.
- Properties currently identified as being at risk are reviewed and their status confirmed within a reasonable timescale.
- Properties that are removed from the database are always checked again at periods of high demand in the summer.
- Automation of data entry into the register be considered.
- Auditable supporting information is kept, as described above.

Comments by Line

Line 1: Brought forward from Line A1.10

Line 2: Properties below reference level carried forward from last year's return

Line 3: Comprises additions due to better information from the OPA Action plan logging studies, operational logging, DOMS investigations, corporate low pressure register and projects promoted by asset planners.

Lines 4 & 5: Additions due to the corporate register, OPA logging and operations information

Line 6: Properties removed due to better information have been identified from the OPA action plan logging, the corporate low pressure register, Capex and WQ schemes, double counting, SWS investigations, DOMS investigations and information from Operations.

Lines 7 & 8: Comprises removals because of asset improvements as a result of Q&SII & III schemes, the Loch Katrine scheme and others. Also includes removals due to operational changes and data on the corporate register.

Line 9: This is a calculated field showing the balance of 7772 properties at the year end.

Line 10: Scottish Water has used the new corporate register to list properties receiving low pressure to be omitted from the numbers reported in Line B2.9.

Comments on Confidence Grades

We believe the confidence grades reported by Scottish Water this year are reasonable.

5.3.2 Lines B2.11 to B2.46 – Planned and unplanned interruptions

Introduction

Key points:

- We believe that the information on interruptions is significantly improved from last year, when Scottish Water found significant data entry errors.
- The new IMS process whereby operatives enter data on handheld devices is now operational across the whole of Scotland. From September/October onwards "force validation" has been operating to ensure completion of required data on handhelds for reporting purposes. The lack of such forced validation was a source of weakness in reporting interruptions last year.
- Manual data entry from site operatives still happens where IMS coverage is not possible. Scottish Water Solutions (SWS) still uses manual data entry.
- The data from IMS is downloaded and stored in a single interruptions spreadsheet for all operational areas.

- The spreadsheet also contains manual entry data. Manually entered sheets are collated and entered by 4 or 5 staff, one in each operational area.

- Last year there was a roll out of methods and procedures, together with guidance notes on the handheld units.

- Information on unplanned interruptions will always be subject to some additional uncertainty as checks cannot be made in the same way as for planned interruptions.

Comments on Methodology

General

The new Integrated Mobile Solution (IMS) process, which uses handheld devices to directly enter data, is now operational across the whole of Scotland for Scottish Water's Staff. SWS data still come into the database using handwritten forms. Data forms are also used in some locations where there are signal and connectivity issues. The paper forms are generally of the same format as those used historically although an attempt has been made to align them with the format of the IMS handheld system. Scottish Water has noted that there is a significant improvement in data completion since last year and particularly more so since September, when improvements were made to the onscreen boxes in the handhelds. These now incorporate a "force validation" where jobs cannot be closed, and staff move onto their next job until certain sections are completed. This is generally data which will be used for monthly reports and the annual return.

When a complaint regarding a loss of supply comes in, it is recorded in Promise and a work order is raised in Ellipse. In the first instance a Network Service Operator (NSO) will go out and determine what the problem is and what needs done. They will also determine if the customer has lost water supply due to the actions of Scottish Water or due to a third party. He will phone back to the Operations Management Centre (OMC) where a work order will be raised in Ellipse. The jobs are assigned automatically to operatives through the handheld device. They are also prioritised by the NSO.

When the squad goes out to look at the job they have to complete a Distribution Operational Maintenance Strategy (DOMS) Impact assessment – this is a safeguarding process for water quality before the operative can shut the water off. On the handheld device, the interruption sheet cannot be opened until this form has been completed.

Handheld devices

At the audit the operation of the handheld device was demonstrated for use in supply interruptions work.

The interruptions sheet contains data regarding the plan:

- Description

- Planned start date and start time and priority

- A H&S risk assessment which needs to be completed before the operatives can move onto the next stage of the work.

- A labour tab which is essentially a time sheet to log staff hours

- A further sheet shows forms which can be selected if required. For example, operatives can fill in another form if they see other work of low priority which needs done in the future (e.g. a broken manhole cover which can be programmed for future squads).

- The DOMS assessment must be completed, once this is complete a decision is made as to whether it is an interruption or not; if yes the interruptions sheet is opened.

In the handheld device, there is a box for a second "water on" time. This would be used if the water supply can be returned to a proportion of the properties by redirecting flows within the network. The "second time" is for the actual repair when the remaining properties have supply returned. This is entered in two lines in the interruptions spreadsheet so the correct restoration times are logged.

In the handheld device, the number of properties affected and then fixed must be the same otherwise the operator cannot move to the next stage.

Squad laptops have GIS on them which can be used to determine the number of properties affected. For a planned interruption the Performance Team use live GIS and a "polygon Select" tool to determine the number of properties affected. An actual house count on the ground is not undertaken, which we believe is reasonable. Address point data are used to determine the number of properties (e.g. flats). Some properties are highlighted as sensitive customers (e.g. hospitals).

There is as opportunity for the operator to enter the water off and water on times from a drop down list. The start of the duration reported is when the "no water" is confirmed by Scottish Water as being their responsibility (i.e. it hasn't been caused by a plumber or the household). It is not necessarily therefore the time that the customer lost water supply.

Currently there is not a QA checking procedure where someone goes out on site to check that the data is being entered correctly. There are still some issues with mobile signals and so not all of Scotland is covered. The handhelds do have the facility to save work information when there is no signal in the area. The data is automatically transmitted back to base whenever a signal is found. If at base, it is noted that a job has not been closed which should have been, SW has stated that this will be chased up and closed out.

Scottish Water has stated that there has been a roll out in the past year to site operatives on the methods and procedures, and guidance notes on using and completing the information on the handheld units. Scottish Water has also stated that information on unplanned interruptions will always be subject to some additional uncertainty as checks cannot be made in the same way as for planned interruptions

Other general information

Some repairs can be done under pressure and therefore they are not considered to be an interruption.

The data used for the return is currently presented monthly for OPA purposes…

For planned interruptions, customers are notified by letter distributed either by post, a Scottish Water operative or a distribution company. The addresses of the properties are therefore known, but are not recorded on the register

The figures reported in lines 16 to 18 come from an analysis of the interruptions spreadsheet which contains information on both planned and unplanned interruptions. We note the following on the information:

- Actual date and time off: this records the time that supply was confirmed to be lost by a Scottish Water NSO rather than the time the customer reported that they had no water. This is generally logged to the nearest half hour or 15minutes.

- Actual number of properties affected: this is determined by Scottish Water staff and is an assessment generally using the GIS rather than an actual house count

- Actual date and time on: this is not necessarily the time when all households have received their water. Rather it is the time the operative deems his work to be completed. Scottish Water has stated that there is no rounding of numbers carried out, although operatives generally enter times to the nearest whole hour, half hour or 15 minutes, as this is what they do for their timesheets. The switch on time is not necessarily when the sampling and testing is completed as Scottish Water states that it would not disturb customers during the night to take a sample when the water is switched back on. Rather, the switch on time is from when the valves are re-opened to re-supply the area. Disinfection is performed at this time only as required by the Hygiene Code of Practice.

We have noted operative behaviour in using 15, 30 or 60 minute increments leads to non-uniform reporting with many interruptions noted at for example the 3 hour period and so on. This gives us concern that the results may be inadvertently biased and we suggest that additional guidance is given to Scottish Water's staff on the need to complete times as accurately as possible.

Interruptions Spreadsheet

The IMS data is sent from the handhelds to ELLIPSE and to the IMS server. On a daily basis data is downloaded from the IMS server and entered onto the base spreadsheet for the return and monthly reporting. The spreadsheet is set up to carry out calculations to put the interruptions into the correct line on the annual return table. The daily downloads are also saved in a folder on the network for QA purposes. Where there are connectivity issues the manual forms are entered in four operational areas directly by an operative in each area (in future this will be under the control of one main person). Scottish Water stated that there has been a data check for missing information on the spreadsheet and where possible this has

been confirmed and filled in. The use of paper forms and manual entry is as per the process in operation before handhelds and is therefore remains subject to possible problems of incomplete and missing data.

The interruptions spreadsheet contains a description of the work, planned or unplanned, pipe size, planned times from OMC data. It also contains information on location, temporary supplies and how the notification took place (e.g. letter).

SWS supply a filled in spreadsheet which is in the required format. This data is entered into the main interruptions spreadsheet. SWS completes this from the manual data supplied to their administrative staff. SW does not see the base data, just the spreadsheet. At the audit we were given examples of the spreadsheet received from SWS. They were compared to the interruptions spreadsheet for a sample of interruptions. It was found that the information matched.

Scottish Water stated that since October/November there has been a system in place to review on a monthly basis all interruptions which are greater than 6 hours – this data is returned to the local manager for review and confirmation of the properties involved. Changes can only be made to the base data after completion of a change form.

From September 2006 onwards the data is considered by Scottish Water to be much improved, Scottish Water further state that they are still working on improvements and there is a Phase 2 improvement programme in place.

The durations recorded in table B2 are cumulative. If it is in the more than 3 hours line it contains figures for 3 hours and above, 6 hours and above, 12 hours and above. Scottish Water has stated that there is no rounding of numbers carried out, although it is generally an operative trait that they enter times to the nearest whole hour, half hour or 15 minutes, as this is what they do for their timesheets. Scottish Water has stated that operatives are being encouraged to enter the actual times in the handheld device.

If a second interruption occurs just after one in the same area has been closed (fixed) this is counted as another interruption.

In the spreadsheet there are a series of calculation columns which allow the time banding for the interruptions to be calculated. There is no rounding up or down of times in the spreadsheet. If this occurs it will have been done at the operator level, either on his handheld or on the manual form.

For the reporting year the data in the spreadsheet is split roughly 50/50 between handheld and manual entry. Issues of "interruptions form" completion and return by operatives may still be a problem for the manually entered data. As the forced validation has only been in place since September/October, there could be issues with IMS data completeness prior to this time. From the data returned, the operator who carried out the work is known. Scottish Water has stated that staff are regularly chased up to provide missing information when an incomplete form has been returned.

Review of Sample data

At the audit a sample of both paper forms and daily downloads from the IMS server were supplied. These were compared to the information in the interruptions spreadsheet. All information on the paper interruptions forms was found to agree with the spreadsheet. However forms from the South West area were not available as they had accidentally been destroyed. In addition one of the samples from the North East, and one from the South East were not supplied. The interruptions spreadsheet was supplied with calculations for planned and unplanned interruptions.

The information from the daily downloads from the IMS server was found to agree with the spreadsheets except in two cases where planned times were missing or inconsistent. We suggest that Scottish Water investigates the reasons for these errors.

We believe that the new IMS system has led to improvements in data records, particularly since September when the new validation procedures came into force. In the reporting year, weaknesses remain around:

- The possibility that the paper records are not completed by the operative, although this should not be a major problem as following a customer complaint the job is logged onto Ellipse and operatives are chased up.
- Properties are estimated by the operative rather than a house count being made. We recommend that Scottish Water considers implementing a checking system on the GIS for all occurrences when the estimated properties affected exceed say 20, or some other relatively low figure that could be estimated fairly easily.
- The tendency of operatives to report times by anything up to the nearest hour. This could lead to bias and we recommend that additional guidance is given about the need for accurate reporting.

Comments by Line

Trends between the current and previous report years are uncertain as significant errors were reported by SW in the previous report year's information.

Lines 11-14: Numbers of planned interruptions and the properties affected is reported differently in AR07, but appears to have reduced since AR06 when the total number of properties affected by planned interruptions was approximately 217,000. The number of properties more than 3 hours planned and warned is reported in AR07 as 92,417. Despite possible errors in JR06 this seems to be a large reduction. There has been a reduction in work on the network in the reporting year.

Lines 15-18: The number of unplanned interruptions and the properties affected is reported differently in AR07, but appears to have reduced since last year when the total number of properties affected by unplanned interruptions was over 100,000. The number of properties more than 3 hours unplanned is reported in AR07 as 83,425.

Lines 19-22: The number of interruptions caused by third parties is reported differently this year, but it appears to have increased since AR06. The number affected in AR06 was 3157; the number of properties affected for more than three hours in AR07 was 5504.

Lines 23 to 25: This is the number of overruns of planned interruptions.

Comments by Confidence Grade

Scottish Water ascribes a confidence grade of B3 to all data on interruptions. This appears reasonable.

5.4 Table B3: Sewage Flooding

Commentary by REPORTER

Key points:

- The PROMISE customer contact system, introduced during report year AR05, is a key source of data on sewer flooding incidents.
- Flooding incidents are reported on main sewers only
- A new sewer flooding register was put in place in the previous report year. This is a register of properties at risk of flooding due to over-loaded sewers. It includes information on flooded properties migrated from the old Sewer Flooding Incident Database as well as new information obtained from PROMISE. This is the register used to produce the figures for the annual return. There have been no changes to the register layout since last year.
- The Register only contains flooding events thought to have been caused by hydraulic overload. There is more information contained in the new application than the register used in previous years. As stated last year, we recommend that the register should include all reported flooding with a clear explanation as to why the property is either included or excluded in one of the at risk categories. We understand that this is Scottish Water's intention for the future.
- Scottish Water has recognised that the reliance on historic reports and the migration of data between systems means that audit trails were not always available to support the inclusion of properties on the at risk register. To address this, a series of customer surveys were undertaken to provide confirmation of flooding incidents. Over 6000 surveys were undertaken in the previous report year. Including this data in the flooding register will improve the reliability of the data. To date only a portion of this data has been reviewed and updates added to the register.
- Within individual records there are significant areas of missing data. Scottish Water has therefore adjusted the table entries to allow for the missing data. For this reason we believe that a confidence grade of B4 is appropriate.
- We recommend that WIC confirms whether flooding incidents and number of properties flooding due to defects on laterals should or should not be included in future Annual Return.

5.4.1 Lines B3.1 to B3.12 – Annual Flooding

Comments on Methodology

General

As with the previous report year, the base data used to identify the number of properties flooded in the year was taken from the PROMISE customer contact system. The data is downloaded from Promise monthly, using Datamart (a Scottish Water business application)

and manually entered into a spreadsheet for data analysis purposes. Data "uplift" is carried out for the sewer flooding figures, because there is a significant amount of missing information.

As for water main interruptions information, data is either recorded on a paper form or on a handheld device. Again, as for interruptions in the early part of the year, forced validation for sewer flooding has yet to be imposed on the handhelds in the entire report year. For the report year a significant proportion of the data has not been fully completed. Missing data includes:

- missing "resolution" codes: and
- missing "choke forms", which, amongst other data, record the results of flooding investigations, including properties affected and whether the flooding is from a main sewer.

Because of the missing data, the results have been "uplifted", in proportion to known data to give an estimated total. The uplift is carried out on a monthly basis and the monthly totals are included in the annual return figures. The methodology is discussed further below.

The PROMISE system is a centralised customer contact system covering a wide range of customer contacts. The contacts are coded in a structured way which allows particular contact types to be recorded and the system to be interrogated. The contact time and the time Scottish Water attended and left the site are recorded. From August onwards Scottish Water has stated that an improved decision making tree of questions has been in operation to enable a better description of the customers problem to be recorded at the customer contact stage. Prior to August possible descriptive terms for flooding were "backing up" and "surcharging type". Since August, a set of new terms is being used which include "Sewage Services (SS) Sewer Flooding – internal" and "SS Sewer Flooding – external". This enables a better prioritising of the work which results from the call and also an improved audit trail. Scottish Water has stated that cleansing of data between April and July has been carried out to determine the flooding causes, where they were not stated. Scottish Water has further stated that the same methodology for recording flooding is being followed across the whole of Scotland, with some regions performing better than others. They believe the data is improved from last year. While we generally agree with this statement, there are clearly still significant improvements to be made.

When internal flooding is identified by a customer this is recorded in PROMISE, a service request is created, and a task is assigned. If Scottish Water confirms that the problem is internal flooding a "choke" form is completed. Completed choke forms allow Scottish Water to determine what are Internal Flooding Overloaded Sewers (IFOS) and what are Internal Flooding Other Causes (IFOC). Scottish Water has stated that improvements are still required with regard to the compliance of completing the choke (for internal flooding the monthly completion rate has ranged from approximately 58% in May 06 to 80% in February 07, so it is improving across the year). On the Choke form the site staff fill out a property count. In the future it is planned that a network performance analyst will check and confirm the property number, which is currently carried out in some areas but not across the whole of Scottish Water. A resolution code is given to the task by Scottish Water staff when they have completed the task and fixed the problem. Compliance with completing the resolution codes has ranged from approximately 35% in April 06 to approximately 82% in February, again

improving across the year. Every resolution code should have a choke form but this is not the case.

The incident address is the customer contact address but modifications can be made on the choke form by site staff. If a squad can't identify the problem, further investigation will be carried out by another team. Scottish Water stated that in this report year there has been a programme of workshops for squads and training in awareness of the need to complete forms and resolution codes correctly, and in the ability of recognising sewer and flooding types etc. Scottish Water believes that there is an increasing understanding by squads of the need for completing forms and handhelds, but that there is still improvement required.

It is Scottish Water's aim that all internal flooding reports will be investigated and confirmed. According to Scottish Water, this has been happening since last September – so there is an improvement in the data from then onwards. They also plan to do a monthly audit check on squads to ensure they are completing their handhelds correctly. This is not currently happening. For external flooding it is unlikely that the customer will be spoken to on site.

Uplift Methodology

Promise data is downloaded into the Datamart and then transferred into the data uplift spreadsheet.

For the annual return any duplications will have been removed from the incident data uplift spreadsheet (such as a second visit to a clean up). The service request number will identify the duplication, as it will be the same as the initial incident (the duplications exist in order to capture the staff time).

Scottish Water believes that due to missing forms and resolution codes they could be under-reporting internal flooding. In order to account for this missing information, data has been uplifted following the process described below. The uplift is carried out for both internal and external flooding and applies to both incidents and property numbers. At the audit Scottish Water stated that the uplift for the number for IFOC is carried out on all sewers including laterals. However the numbers included in Table B3 are for Main sewers only.

On a monthly basis there is a known number of customer contacts which were initially considered to be to do with sewer flooding. On assessment and resolution on site by Scottish Water, the flooding types are determined using the following categories (resolution codes):

- Sewer flooding - external
- Sewer flooding – highway
- Sewer flooding – other flooded areas
- Sewer Flooding – internal
- Backing up
- Backing up – private
- Other

In addition to the above there will be a number of customer contacts which have no resolution code, likely to be because the squad did not complete their forms.

For internal flooding, this is further split into the following types (on the choke form):

- Internal Flooding – private
- Internal Flooding Overloaded sewers
- Internal Flooding Other Causes

Again, at this stage, there will be incomplete data and missing incident/choke forms.

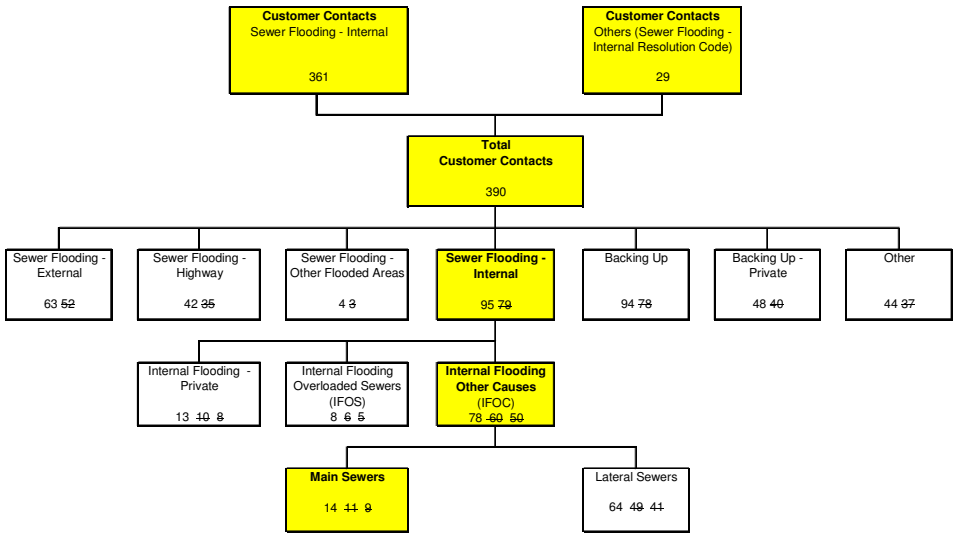
On the choke form this is further split into Main and Lateral sewers.

For the uplift, the contacts with missing resolution codes are first split between the known resolution codes in proportion to the known resolution code information. This uplift is carried out in proportions to the known values in each category: external, highway, other flooded areas, internal, backing up, private and other

This leads to all the resolution code categories having increased numbers.

The Internal Flooding Other Causes is also split into main sewers and laterals by a known proportion (from the choke form).

A further uplift then occurs based on the missing incident forms and incomplete data. A tree explaining the process was provided by Scottish Water and is shown below (We note some inconsistencies in the example provided)



Scottish Water has stated that it is returning its best estimate of the figures based on its available information. The uplifting of figures is carried out on a monthly basis with the annual return figure being a sum of the monthly uplifted figures. For "Internal Flooding Overloaded Sewers" on main sewers, 48% of the total figure is based on the uplift process,

for "Internal Flooding Other Causes" on Main sewers, 38% of the total figure is based on the uplift process, and for "Internal Flooding Other Causes" on lateral sewers the figure is 46%. There is therefore a significant amount of missing data, and the figures in the annual return include considerable assumptions.

For external flooding a spreadsheet was provided which showed that a similar uplift process was carried out. For EFOC on mains only the figure was uplifted from 4713 to 7513 and for EFOS on mains only the figure was uplifted from 395 to 620.

We reviewed some samples of entries downloaded from Promise and noted the following:

- Resolution codes other than the standard can be entered on Promise.
- There are opportunities for double counting arising from how the Datamart stores address information.

Scottish Water has noted that its new Information, Data and Reporting group is charged with making material improvements to the robustness and confidence in sewer flooding information. Scottish Water has stated that it has improved the information obtained on the first contact with the customer to provide improved data required to complete the Annual Return accurately. We understand that there is an initial programme of internal flooding validation by Scottish Water staff, to confirm cause, address no of properties affected. This should allow clear evidence of internal flooding to be recorded. .

Comments by Line

Lines 2 to 5: The number of flooding incidents due to overloaded sewers is reported as 58 on main sewers only. The number of properties affected has increased since the previous year. The data cannot be directly compared to last year as last year there were significant inaccuracies in the information. This year reports relate to main sewers only; last year laterals were also included.

Lines 6 to 12: Annual flooding other causes has been reported on main sewers as 185. The number of properties affected is 475 which is less than last year. The information cannot be directly compared to last year as last year there were significant inaccuracies in the information. Unlike overloaded sewers we believe that last year's figures excluded laterals.

Lines 3 and 11: Scottish Water has stated that it cannot currently complete line B3.5 or B3.11, as it does not record unoccupied basements and below floor flooding separately. Scottish Water plans to improve its systems to allow this to be reported.

Line 17: Scottish Water stated that there were no severe weather incidents this year. Scottish Water stated that it is difficult to prove isolated events are severe weather as often the Meteorological Office will not be able to obtain data for the specific location.

From our experience elsewhere we know that rainfall data can be difficult to obtain. This is particularly true of peaky summer storms. Nevertheless, we recommend that Scottish Water obtains information whenever possible as rectifying flooding is often expensive and it is important that flooding is properly categorised to allow effective prioritisation. Sewer flooding and its rectification is increasingly seen as an important issue in England and Wales and water companies are expected to have reasonable categorisation and prioritisation systems.

Comments by Confidence Grade

Lines 2-12: Given the lack of complete information this year we consider that a confidence grade of B4 may be more appropriate than the grade of B3 suggested by Scottish Water. We accept that the assignment of confidence grade is difficult and subjective in these circumstances.

5.4.2 Lines B3.13 to B3.28 – Properties on the "At Risk" Register

Comments on Methodology

The register of flooding, which was put in place in the previous report year, is still in use this year with no changes to the format of the database. It is known as: the "Corporate Satellite Application" or "Tactical Application". This application is a database which has been populated with data from the previous register. It lists each property which has flooded due to hydraulic overloading. It is updated either with reports from PROMISE (when a customer interview form or when a flooding incident affected property record is completed) or with information from operations or asset planners. It is also in the process of being updated with information from a customer survey of over 6000 properties last year, but this update is only partially complete.

The flooding register was originally formed following the amalgamation of the 3 former water authorities in 2002. In the former West Area a flooding register already existed, while in the East, SIIOPs information for Drainage Area Studies was used. This gave a list of historical, predicted and unconfirmed incidents, but covered a limited time span and was unlikely to be complete. No customer contact information was contained in this list. The former North Area had no flooding register and GMS payments were used to identify property flooding. New flooding properties are incorporated from PROMISE, which as described in the previous section, may not have accurate information due to missing forms and resolution codes

Scottish Water's flooding register was historically updated from a variety of sources including:

- Flooding recorded on PROMISE.
- Flooding recorded on the Sewer Flooding Incident database (replaced by PROMISE in August 2004).

- Investigations of known clusters including the results of drainage area studies.

The current at-risk numbers are based on:

- New reported flooding incidents; and
- Historic reported flooding incidents, a proportion of which have been confirmed by customer survey

The information added to the flooding register is limited to flooding caused by overloaded sewers. This includes flooding during severe weather which is given an extreme event tag.

The Reporting Requirements now call for Scottish Water to maintain an internal "At Risk" register which should form a database of all properties which experience internal sewer flooding, and an external "At Risk" register which should form a database of all properties which experience external sewer flooding The register must clearly identify those properties below the reference level, distinguish them from those which have flooded but are not below the reference level and provide a verifiable reason for the exclusion (e.g. flooding was a result of a blockage).

As reported last year the main data page is a locations table which contains a list of unique property references subject to flooding:

- ID
- Incident Date
- Address
- Impact
- Operational Area
- DAZ
- Flooding Cause
- Removed

Behind this page there is an incident record page. The incident record card contains the following information:

- ID
- Legacy ID
- Address
- Location type
- Maximum Impact
- Register Class
- Cluster Reference
- Removal Reason
- Operational Area
- DAZ
- Drainage Operational Area
- No. Incidents
- Easting
- Northing
- Postcode

The incident data has further support information which includes Register Class as follows:

- 1 in 10 (on register)
- 2 in 10 (on register)
- 1 in 20 (not on register)
- Severe (not on register)
- DAS Only (not on register)
- Other Causes (not on register)
- Scheme (not on register)
- Removed due to better information (not on register)
- Holding (flood reported but not checked and not on register)
- 1 in 10 default (return period unknown but probable, on register)
- 2 in 10 default (return period unknown but probable, on register)

Incidents can cover more than one address. The incident table can detail the properties affected in an incident.

Scottish Water has recognised that the reliance on historic reports and the migration of data between system means that audit trails were not always available to support the inclusion of properties on the at risk register. To address this, a series of customer surveys were undertaken to provide confirmation of flooding incidents. During the previous report year Scottish Water carried out a pilot data improvement project using customer surveys to validate information held on the flooding register. The pilot project covered 269 properties, with a return rate of approximately two thirds. Door to door surveys were carried out in order to determine whether properties on the register had ever suffered from internal flooding, the date of the flooding and to confirm exact addresses. Information from the pilot study was fed into the register, resulting in the addition of a small number of properties to the register in the previous year.

A more extensive data improvement project was then carried out and over 6000 surveys were undertaken. Including this data in the flooding register will improve the reliability of the data but to date only a portion of this data has been reviewed and updates added to the register.

The completion of this customer survey project will provide good supporting data for the at risk register, and has produced some movements in the register in this report year. It is recognised that it will not provide complete data, for example, it is may not allow dates of historic flooding incidents to be confirmed.

When a property is first reported as being flooded by a customer it is flagged in a holding category. Following the completion of an initial investigation that confirms the property has actually flooded it is put on the 1 in 10 year category. Only if it is flooded a second time in 10 years is it moved to the 2 in 10 year category. When a property is first added to the 1:10 year category Scottish Water does not review storm frequencies, undertake additional customer surveys or undertake hydraulic modelling to confirm that it has been correctly allocated.

The flooding register identifies whether a property is in the 1 in 10 or 2 in 10 at risk categories. In addition there are Default 1 in 10 and Default 2 in 10 categories which are used where the category has yet to be confirmed. The category selection is based on a frequency of flooding using the best available data pending further investigation. In principle, a

property with a single recorded flooding incident is included in the 1 in 10 at risk category and a property with two or more reported incidents of flooding is included in the 2 in 10 year at risk category. Of the current 496 "2 in 10" properties, 365 are "Default 2 in 10". Of the 546 "1 in 10" properties, 436 are "Default 1in 10". Therefore a significant number of the reported figures are still not confirmed as real flooding. Other categories within the database are listed above. "Holding" is a further category for incidents which have yet to be investigated and confirmed. There is a 1 in 20 category in Table B3. However Scottish Water is reporting this figure as zero. Properties which are found to flood, which have never flooded previously are put in the holding category until they are confirmed. Currently there are no additional modelling or customer survey checks carried out on new reported flooding locations before they are entered onto the register. This is planned for the future. The situation in England and Wales generally is that on first flooding properties are put in the 1:20 year register unless they are assessed as requiring to be put into another category.

On looking at a few samples in the register, it was noted that although they were listed as having only 1 flooding incident, they were called 2 in 10 rather than 1 in 10. There therefore appears to some errors in the register.

The "at risk" register numbers are generated by queries on the flooding register, and manually checked and compared with data from last year. The database is frozen and an "annual return" copy retained for record.

It is important for the Business Plan that properties on the register are as accurately categorised as possible. We therefore recommend that Scottish Water completes recording the data from its survey within the year and checks all existing entries for accuracy. The basis for each categorisation should be clearly supported.

During our review we audited a number of entries on the at risk register. We concluded that entries, which were audited in detail, generally had reasonable supporting data. However, there were some errors or inconsistencies in the register and other reports were not supported by customer contact data or customer surveys. We recommend that Scottish Water improves its supporting documentation, particularly as it will be needed to support its capital expenditure proposals in the Business Plan.

Our conclusions are as follows:

- The current at-risk numbers are based on reported flooding incidents, some of which are supported by drainage area studies or customer survey. The base records were developed from the three predecessor authorities, which cover a limited time span and may not be complete or accurate.

- New flooding properties are incorporated from PROMISE, which as seen in the previous section, may not have accurate information due to missing forms and resolution codes.

- We conclude that it is probable that time and further investigations will reveal additional properties at risk of flooding which are not included in the current records.

- There is still significant work to be done to improve the accuracy of the data in the register. Inputting the data from the Customer Survey will significantly improve the data stored and the figures reported in the annual return.

- We also recommend that Scottish Water develops a procedure for checking total numbers of properties (including surrounding properties) for newly flooded properties.

- We recommend that Scottish Water improves the quality of its supporting information in order to ensure that there are no anomalies between it and the information in the register.

Comments by Line

The register has reduced in the report year by 188 properties, 116 were removed due to authority action, 132 were removed due to better information, and 60 were added due to better information. It was noted that both the 2 in 10 and the 1 in 10 categories were reduced

Line 13: This line identifies the number of properties in the register that have had 2 or more reported flooding incidents in the last 10 years. It has reduced from the previous years return. This reflects the refining of the information on the flooding register following investigations and the capital schemes carried out. In the register, properties can have a default 2 in 10 description which implies two records of flooding but no incident dates, or no actual confirmation of a flooding incident.

Line 14: This line identifies the number of properties in the register that have had 1 reported flooding incident in the last 10 years. This is also reduced since last year. This decrease reflects the refining of the information on the flooding register following investigations. In the register, properties can have a default 1 in 10 description which implies one record of flooding but no incident date.

Line 15: Sum of 3.13 and 3.14

Line 16: Scottish Water is not reporting in this category.

Line 17: This line identifies properties where there has been no incident in the last 10 years. 62 are reported this year. Scottish Water stated that they do not believe that the Meteorological Office can provide sufficient information for localised storm events to determine if they are exceptional. They do provide sufficient information for less localised or nationwide exceptional weather.

Line 18: Scottish Water has undertaken a programme of "spend to save" initiatives in order to offer temporary solutions to some of their flooding problems. 120 are reported this year, but only a list which detailed 40 properties which had temporary solutions installed this year was provided for our review.

Line 19: Balance remaining to be solved by taking 3.18 from 3.15.

Line 20: "Properties removed by authority action". This figure represents the outputs from Scottish Water's capital investment schemes reported as reaching their beneficial use state. There is a decrease from the last reporting year. Modelling evidence was supplied for the audit for locations, where there was a number of properties removed by authority action, which generally showed that flooding did occur and was removed after the work was carried out.

Line 21: This reflects continuing efforts to cleanse the historic data, and has increased since last year.

Line 22: Properties added due to better information, have decreased substantially from the last reporting year. It includes incidents from PROMISE, and properties associated with schemes completed this year which are also included in Line 20 - removed due to authority action (see above).

Line 23: Nothing has been included in the return against increased demand. Changes in population and water use are generally small and their impact would only be identified if there is a reported flooding incident.

Line 24: This line gives the average costs of all capital works identified as coming into beneficial use in the previous 12 months, measured as total out turn costs divided by the properties removed.

Line 25: Scottish Water has identified a minor amount of opex costs relating to the permanent solutions installed to date.

Line 26: This line gives the average costs relating to all temporary solutions in place. It is derived by dividing the total costs allocated to the schemes by the number of properties relating to each scheme. It has increased compared with last years return.

Line 27: Scottish Water has not identified any opex costs relating to the temporary works.

Line 28: Scottish Water has stated this value as 3. This figure has not been audited.

Comments by Confidence Grade

Lines 13 to 23: Given the current difficulty of assessing the true numbers of properties at risk and the fact that the information from the customer surveys have yet to be fully entered on the database we believe that any confidence grade assigned to the data will be very uncertain. As a best guess we consider that a confidence grade of B4 may be more appropriate than the grade of B3 suggested by Scottish Water.

5.5 Table B3a: Sewage – External Flooding

Commentary by REPORTER

Key points:

- The PROMISE customer contact system, introduced during report year AR05, is a key source of data on sewer flooding incidents.
- Flooding incidents are reported on Main Sewers only
- A new sewer flooding register was put in place in the previous report year. This is a register of properties at risk of flooding due to over-loaded sewers. It includes information on flooded properties migrated from the old Sewer Flooding Incident Database as well as new information obtained from PROMISE. This is the register used to produce the figures for the annual return. There have been no changes to the register layout since last year.
- The Register only contains flooding events thought to have been caused by hydraulic overload. There is more information contained in the new application than the register used in previous years. As stated last year we recommend that the register should include all reported flooding with a clear explanation as to why the property is either included or excluded in one of the at risk categories. We understand that this is Scottish Water's intention for the future.
- Scottish Water has recognised that the reliance on historic reports and the migration of data between systems means that audit trails were not always available to support the inclusion of properties on the at risk register. To address this, a series of customer surveys were undertaken to provide confirmation of flooding incidents. Over 6000 surveys were undertaken in the previous report year. Including this data in the flooding register will improve the reliability of the data. To date only a portion of this data has been reviewed and updates added to the register.
- We recommend that WICS confirms whether flooding incidents and number of properties flooding due to defects on laterals should or should not be included in future Annual Returns.

5.5.1 Lines B3a.1 to B3.10 – Annual Flooding Summary (i) Overloaded Sewers (ii) Other Causes

Comments on Methodology

Scottish Water's methodology for external flooding is the same as that for internal flooding and similar conclusions apply.

Comments by Line

Lines 1 to 5: The total number of flooding incidents due to overloaded sewers is reported as 545 which we believe are on main sewers only. The figure is uplifted from a reported figure of 395, which indicates the uncertainty in the result.

Line 6: Scottish Water stated that there were no severe weather incidents this year. Scottish Water stated that it is difficult to prove isolated events are severe weather as often the Meteorological Office will not be able to supply data in that specific location.

Lines 7 to 10: Annual flooding, other causes, has been reported on main sewers only as 7515. These figures are uplifted as discussed above and so are based on a large amount of missing information.

Comments by Confidence Grade

Lines 2-12: Given the lack of complete information this year we consider that a confidence grade of B4 may be more appropriate than the grade of B3 suggested by Scottish Water. We accept that the assignment of confidence grade is difficult and subjective in these circumstances.

5.5.2 Lines B3.11 to B3.25 – Properties on the "At Risk" Register

Comments on Methodology

The methodology for external flooding is the same as that for internal flooding and our narrative for Table B3 also applies.

Comments by Line

Line 11: This line identifies the number of properties in the register that have had 2 or more reported external flooding incidents in the last 10 years. In the register, properties can have a default 2 in 10 description which implies two records of flooding but incident dates are not necessarily recorded.

Line 12: This line identifies the number of properties in the register that have had 1 reported external flooding incident in the last 10 years. In the register, properties can have a default 1 in 10 description which implies one record of flooding but incident dates are not necessarily recorded.

Line 14: Sum of 11 and 12.

Line 17: "Properties removed by company action". This figure represents the outputs from Scottish Water's capital investment schemes to remove internal flooding, where external flooding was on the register, reported as

reaching their beneficial use state. Evidence supplied to support external flood removal was not to the same standard as that supplied for internal flooding removal.

Line 18: This reflects continuing efforts to cleanse the historic data.

Line 19: Properties added due to better information.

Line 20: Nothing has been included in the return against increased demand. Changes in population and water use are generally small and their impact would only be identified if there is a reported flooding incident.

Line 21: This line was not reviewed in detail.

Lines 22-25: Scottish Water has identified no costs relating to the permanent or temporary solutions installed to date.

Comments by Confidence Grade

Lines 11 to 25: Given the current difficulty of assessing the true numbers of properties at risk and the fact that the information form the customer surveys have yet to be fully entered on the database we believe that any confidence grade assigned to the data will be very uncertain. As a best guess we consider that a confidence grade of B4 may be more appropriate than the grade of B3 suggested by Scottish Water.

5.6 Table B4: Customer Service

Commentary by REPORTER

Introduction

At period 7 (November 1st 2006) Scottish Water was split into two parts: Scottish Water and Scottish Water Business Stream. Scottish Water Business Stream is a separate company operating under license responsible for providing retail services to business customers including billing business customers. As part of the separation of wholesale and retail activities, Scottish Water Business Stream took on the responsibility of operating the "Hi-Affinity" billings system which generates figures for lines B4.1 to B4.14 and part of lines B4.15 to B4.21, which relate to written complaints. The remainder of the information on written complaints are generated from the "Promise" customer contact system, which is used for all SW operational contacts and remains the responsibility of Scottish Water.

Currently Scottish Water provides the services of the post room and the telephone system to Scottish Water Business Stream under a SLA

Because of the split data for the Annual Return has been sourced as follows:

- Prior to 1st November 2006 all data is from Scottish Water
- Post 1st November 2006 information from Hi Affinity has been sourced from a data dump from Hi Affinity provided by Business Stream. The analysis was undertaken by Scottish Water.
- Information on telephone contacts for the whole year has been sourced from the common telephone system using information from the differing lines used by the two organisations.

For our audit we had access to Business Stream personnel for points relating to the period before the split. Our discussions with the Business Stream did not include any formal audit back into Hi Affinity on the post split data; nor did it include any review on any changes that the Business Stream had made post the split.

We recommend that need for audit of Business Stream data be clarified for next year's audit.

Key points:

- Subject to the restrictions on auditing the data of the Business Stream (see above) we believe that methods used this year are similar to those used last year.
- Subject to any detailed points described in the sections below we believe that the information in Table B4 is accurate, reflecting the confidence grades applied. It should also be noted that Scottish Water has now completed its cleansing of the information in Hi Affinity. The data cleansing operation impacts the billing system

but does not impact the quality of the contact information. We believe that the accuracy of all general reporting from Hi affinity is now good.

- We note that in the Business Stream report (Column 2) the total number of billing, charging and metering enquiries at 58740 (Line 1) significantly exceeds the total number of telephone contacts at 41,777. This may indicate the large number of written contacts received but we have not audited these figures.

- There have been no changes this year concerning how Scottish Water responds to complaints.

- Complaints are either dealt with immediately by the Adviser on the telephone or escalated to a Team Leader. Finally, if the matter cannot be dealt with then and there (possibly needing a written response or further investigation) it is finally escalated to a small dedicated team (Customer Relations). Scottish Water's philosophy is that all complaints are dealt with at the time. The specialised Customer Relations section gives confidence that complaints are dealt with efficiently. The Customer Relations department will nearly always respond in writing, but in some cases a telephone call or visit from a Field Customer Adviser is considered to be more appropriate.

- Scottish Water does have procedures in place to re-direct complaints received directly by it contractors.

- Initial screening of letters for complaints is done in the post room but Advisers also direct any letters that they believe to be complaints to Customer Relations. While any system can miss a few complaints we believe that Scottish Water's systems and procedures should deal with complaints properly. Business Stream mail is delivered to Business Stream unopened.

- As WIC carries out its own audits of the customer complaints system we have not undertaken any audits of the quality of Scottish Water's responses.

- Last year Scottish Water only reported telephone complaints where the customer had requested a written reply. This year, as required, all telephone complaints have been included.

- The total number of written complaint correspondence has been obtained by reporting both the original contact and any later "linked" contacts. These later contacts can relate to either a further written contact or a telephone conversation with the customer relations person dealing with the matter. Any initial written response to the customer gives a personal contact number should the customer want further information. While we believe that the return is a practical interpretation of the requirements of Line B4.15a it is not necessarily a literal interpretation of the line definition. Although not audited for the Business stream we understand that Hi-Affinity does not link subsequent contacts but opens a new contact. We understand that this is the reason why the Business Stream column shows lines B4.15 and B4.15a as the same

- Scottish Water tries to log all contacts onto Promise (Customer contact System) and Hi Affinity. Last year we noted that approximately 10% of all the incoming calls were transferred. Of these approximately 25% were internal transfers where

customers had rung up on the wrong number and had therefore been answered by the wrong team. Pre the split Scottish Water gave us comfort that they were not double counted on Hi Affinity and Promise. Post the split this continues. When there is more than one retail organisation guidance should be given as to whether these transfer calls should be logged. The remaining 75% were transferred out of the department elsewhere in Scottish Water. The telephone system is unable to identify easily the destination of these calls but discussions with customer representatives at the time indicated that many were transferred to Developer Services (new connections), whose calls go through the call centre. This year more limited data is asked for and this is less obvious. We assume that this discrepancy continues.

- We note that the total telephone complaints returned under Line B4.29 for the Business Stream is very low at 10. We are informed by Business Stream that while there is a complaint code, operators are not instructed to use it. Complaints are escalated to team leaders who either deal with it at the time or Business Stream encourages the customer to put their complaint in writing. This is not the case in Scottish Water where Promise operators are instructed to log telephone complaints.

- As well as its primary duty Hi Affinity is used for internal job management using an "Internal" code. These are correctly excluded from the return. During our audit last year we noted a discrepancy that Scottish Water stated stemmed from the incorrect use of the code early in the reporting year, leading to some internal contacts being included in the statistics early in the year. This year we were informed by the Business Stream that they have been carrying out spot audits to check that internal contacts are being correctly allocated to the "I" code. These audits had not shown up any errors. The Business Stream acknowledged that some misallocations could occur as long as Hi affinity was used for internal work planning. It was further stated that Business Stream was investigating implementing an external workflow system that would completely stop any misallocations occurring in the future.

- Septic tank emptying is recorded on a dedicated commercial database called Gemini, which is well known for recording tanker movements. Because of uncertainty concerning the accuracy of the queries the data for this year have been based on an analysis of paper records. We recommend that the database queries are reviewed and the use of the database to derive the return reinstated. Septic tanker management is based at Scottish Water's Balmore Road depot and does not form an integrated part of the normal Customer Service Department. We understand that two small septic tanker operations in the Western Isles and Hebrides which may not have been included in the figures in AR06 have been included this year.

Scope of the audit

Because of the formation of the Business Stream during the report year our audit was more complicated than in previous years.

- Scottish Water was provided a data dump from the billings system "HI Affinity" for the first 7 months. This was analysed by Scottish Water to provide the non financial numbers in Tables B4 and B7 for its section of the table.

- At the beginning of the financial year Scottish Waters General Ledger, "Peoplesoft" was split into parallel sets of accounts (including the accounts relating to GMS payments).

- We were able to audit Scottish Water's figures in the normal way, including how they derived the table entries from the data dump from Hi Affinity.

- We audited back figures from the data dump relating to the first part of the year into Hi Affinity after being given access to Business Stream personnel.

- We discussed general points relating to the procedures within the Business Stream, particularly as they related to the early part of the year to allow us to assess the likely accuracy of the information.

- We did not audit the figures in tables B4 and B7 that were entered under the Business Stream column.

We recommend that the scope of audit of the Business Stream is clarified for next year.

Comments on Methodology

General

The report year has been an interesting year for Scottish Water's Customer Services Department. The main development has been the split of the department into Scottish Water and Business Stream at the end of Period 7. The following departments migrated to form Business Stream:

- Key customer management
- Small and medium enterprise management
- Strategic liaison
- Credit management
- Debt management
- Billings and billings call centre

Apart from normal operations the most significant activity has been completion of the data cleansing exercise concerning customer accounts information on the billings system, Hi Affinity. As part of the data cleansing exercise Scottish Water has tried to resolve outstanding queries on bills and as a result Scottish Water reports that billing enquiries have decreased as well as bad debt. Both these are positive developments.

WIC is concerned that as a result of the data cleansing exercise the number of remaining non household properties is lower than would be expected. Scottish Water believes that the current total non household properties are correct:

- A very small sample indicates that their numbers are consistent with the Assessors' (rates) database. However, given the very small sample a proper structured sample will be carried out this year to confirm the numbers.

- Many of the items that were cleansed were items with a rateable value such as hoardings, bus stops and so on but which had no supply.

- Despite the fall in numbers its revenue has been maintained, indicating that much of the cleansed information was to do with non revenue producing items.

In previous years we have described Scottish Water's systems and methodology in this section. For completeness we repeat this with minor amendments below. In particular in the Section on Hi Affinity we describe how Scottish Water (and now Business Stream) excludes "pending" contacts. We continue to believe that guidance as to whether these contacts should or should not be included would be beneficial.

For ease of narrative we describe the system pertaining in the first part of the year using the collective word "department" to cover both operational and billing services.

The department has two customer contact corporate systems:

1. "Promise", a customer management system based on an Oracle database, which deals with all customer contacts other than billings, and

2. "Hi-Affinity", a billings database.

Together with Scottish Water's financial accounting system, Peoplesoft, these two databases generate the greater part of the information reported in tables B4 and B7.

Unlike a water company in England and Wales, Scottish Water does not directly bill its domestic customers. Therefore non-billings contacts form the greater part of Customer Service work.

Customer Service is organised into two main sections, with sub-sections and more minor sections as follows:

1. Customer Accounts (now the Business Stream):

    a. Key customers

    b. Small and medium enterprises

    c. Strategic Liaison, responsible for liaison with councils

    d. Credit management (business billing)

    e. Metering (following the split this has moved to Customer Operations)

    f. Debt management

2. Customer Operations (still Scottish Water)

    a. Contacts (Promise)

b. Field Customer relations comprising 16 field based staff who visit customers (Usually following a request by the customer but possibly pro-actively following serious complaints involving property damage from bursting mains or sewer flooding).

c. Customer Relations, who deal with complaints.

3. Customer Marketing, who amongst other things ensure a consistency of approach by the department (following the split this has moved to the Business Stream).

4. Emergency Planning. (Still Scottish Water)

The Customer Operations Department is manned 24 hours per day for 7 days a week. Customer Accounts are manned Monday to Friday between 9 am and 5 pm.

Promise contact management system

Promise is a commercially available package that has not needed to be adapted in any significant way for Scottish Water. It has two advantages over other systems that we have seen:

1. Working from an initial definition of the contact type it prompts the Advisers to ask a structured series of questions such that the problem can be more efficiently addressed by Scottish Water's operational staff, who frequently have to respond to a contact.

2. It enables the Adviser to view an operator's diary and schedule a visit immediately while the customer is still on the phone using dedicated teams. Any follow up work is scheduled on Scottish Water's workflow system, which can be viewed by the Promise operator if he/she receives further contacts from the customer.

Promise has a full set of contact codes, which we believe should allow effective reporting of WICS information, without additional work outside the database. Additional contact types can easily be added should the need arise. Scottish Water has developed a set of sub-codes for use in its business that supports the high level WIC codes. Promise allows complaints to be recorded.

We have reviewed how contacts are opened and closed on Promise. Contacts are opened when the customer's call is answered. Contacts are closed in one of two ways:

1. Within the department the contact is closed by the Adviser or by the person completing the action (for example after sending out an application form).

2. When a field operative completes the visit or action he flags the action as completed on his laptop. This is usually synchronised with Promise immediately. That night promise automatically closes all contacts which have action completed flags.

We noted that this means that all contacts are closed, even if the action has not solved the problem. However, we accept that the action (i.e. a visit) will have been substantive, which we believe meets the reporting requirements (as mentioned above any follow up action scheduled by the operative is recorded on Scottish Water's work scheduling system, WAMS which is available for the Promise Adviser to view should the customer ring again). Two years ago we reported that Scottish Water was investigating whether an automatic synchronisation between Promise and WAMS could be established. We understand that Scottish Water has dismissed this option for the duration of the regulatory period to 2010 but instead intends to commission an additional software module to act as a combined work scheduler, taking inputs from both Promise and WAMS and providing a single view of each field operative's workload.

Since the "promise to resolution" initiative all calls relevant to the department have been logged onto Promise. This was not the case in prior years when trivial contacts were not logged (as many domestic customers are not known before a contact occurs, the person's name and address has to be set up on the system). Trivial calls have always been captured as part of the difference between the total of calls logged by the telephone system and those logged on Hi Affinity and Promise.

Last year we noted a large discrepancy between the total number of calls answered and logged on the telephone system and those logged on Hi Affinity and Promise. Given the reduction in data requirements this year this fact is less obvious. Last year investigations showed that these relate to calls diverted elsewhere in the business. These totalled approximately 68,000 calls in 2005/6 and without further programming of the telephone system it is not possible to get a breakdown of the destination of these calls. However, discussions with those who take the calls indicated that many of them relate to providing new connections (dealt with by the Developer Service department.

We have not audited the detailed query routines that generate the information for WIC. However, in prior years we discussed the user testing that is undertaken when queries are written. We believe that the procedure is sound. Subject to the queries having been properly structured we believe that Promise is capable of delivering accurate information to WIC on all logged calls.

Hi-Affinity billings system

Hi-Affinity has been in use since early 2003. Like Promise, Hi-Affinity allows contacts to be recorded against a customer using a series of codes to allow different contact types to be recorded. The codes that are used in Hi Affinity to generate information for the Annual return comprise:

1. Communication type codes (e.g. G: written complaint).

2. Event codes (e.g. CINV: Copy invoice requested).

Hi-Affinity allows a contact to remain open, even if there are subsequent contacts. Therefore if a holding letter is sent the contact can remain open (marked as "pending"). Hi-Affinity automatically records the time and date of the contact's opening and closure. This is illustrated below:

	10256 (contact no)	10257 (contact no)
Open contact	Send holding letter (e.g. notice of a bill repayment) and open pending contact	Complete action and close pending contact (e.g. bill repayment)

The two contacts are linked.

When completing the customer service tables Scottish Water does not include the pending contacts in its return. We suggest that WIC considers whether pending contacts should or should not be included in Scottish Water's returns. We accept that a holding letter is enough to allow the closure of the first contact. However, we note that on Promise the equivalent to the pending contacts on Hi Affinity are recorded.

We reviewed whether the contact was closed before another department completed the action (for example if contacts were closed before a cashier's over night run actually dispatched a cheque). We noted that this does happen but that Scottish Water does send out a letter informing the customer that a cheque will be sent. We accept that this should be sufficient to allow the contact to be closed (While this is likely to remain the case in the business Stream we have not re-audited this fact).

Last year we noted that as well as its primary duty, Hi Affinity was used for internal job management using an "Internal" code. These were correctly excluded from the return. However, during audit we noted a discrepancy that Scottish Water stated stemmed from the incorrect use of the code early in the reporting year, leading to some internal contacts being included in the statistics. While we accepted that the use of the code has been improved and Scottish Water intended to further tighten up its procedures we recommended that Scottish Water should review whether job management on Hi Affinity can be better "ring fenced".

We discussed the situation this year. Business Stream staff stated that Hi Affinity continues to be used for internal job scheduling and accepted that misallocation could occur. However, they stated that they regularly undertake QA audits of samples of contacts during which allocations are checked. They stated that they had not found any mis-allocations. They further stated that they recognised that this could introduce a weakness in the system and were considering installing a separate workflow system, outside Hi-Affinity. If done, this would remove any residual problem.

We noted that the numbers of voids recorded on Hi-Affinity for un-measured non domestic properties appeared to be high at 13.5% of the total. This concern remains from previous years. Scottish Water has recently set up a small team (the Premises Validation team) who will be looking into voids. They plan to approach the job initially by accessing public information. If the initial work shows that significant numbers of voids are, in fact occupied, they will consider how their work can be developed further to gain accuracy in the customer base.

As for Promise, and subject to our comments on voids above, we believe that Hi-Affinity is capable of generating the information required by WIC.

Receipt of mail

Mail is received in the post room and it is immediately sent to the relevant section who records it on Promise or Hi-Affinity. We accept that mail is logged on to the system on the day that it arrives.

Following the split a single post room remains. The mail is sorted by Scottish Water and all mail addressed to Business Stream is sent to them unopened. If on opening the letter is thought to relate to Business Stream a Business Stream member of staff is asked to check that the mail is for Business Stream.

Complaints

Scottish Water and pre the split

Many complaints are dealt with on the phone by the Adviser and are logged as complaints under the relevant code. While there is a code on Promise for a complaint these are not necessarily recorded as complaints by the Adviser taking the initial call. Where an Adviser cannot resolve the issue at the time the complaint is escalated first to a team leader. If the team leader believes that the complaint requires a written response then it is escalated to the Customer Relations Section. This is a small department of experienced staff whose sole job is to resolve complaints. The Customer Relations department will nearly always respond in writing, but in some cases a telephone call or visit from a Field Customer Adviser is considered to be more appropriate..

Any phone calls received at non Customer Service numbers are redirected to Customer Service immediately; the customer is not asked to ring another number. The fact that Customer Service is manned 24 hours per day facilitates this.

Written complaints come direct to the Customer Relations Department. Scottish Water has a specific post office box for complaints. However, the post room scans all incoming mail and if they believe that it is a complaint they direct it immediately to Customer Relations. If an Adviser receives a letter and they believe that the letter constitutes a complaint then they scan it and send to Customer Relations.

Should the response to the complaint not be considered sufficient and a further complaint on the same topic is received it is "linked" to the original complaint on Promise. This mechanism is used to complete Line B4.15a.

Scottish Water tries to divert complaints away from contractors by prominently displaying its Customer Service telephone numbers on all signboards and so on. Where, complaints or other communication does get through to the contractor the contractor is instructed to divert the call to Scottish Water. Mail is also re-directed. The contractor is required to note the day that the letter was received and it is this date that is logged onto the system. In discussion with Contractor's liaison operative in Customer Services it was stated that the complaints that go to contractors are minimal. This is accepted.

Customer Relations uses Promise to manage its contacts in the same way as all other advisers. Where holding letters are sent Customer Relations record this in the memo field and keep the contact open on the system.

We understand that Waterwatch Scotland now carries out audits of Scottish Water's customer service system. Therefore, we have not audited either the tone of the incoming letters nor the quality of the letters sent out by the Customer Relations department. We have not audited either the number or the effectiveness of the system for re-directing calls or letters received elsewhere in the business. However, from our discussions with Customer Relations staff, we believe that the use of a specialised group of experienced staff, the use of Promise as the contact management system, and the procedures described to us mean that Scottish Water does manage its customer contacts effectively.

Business Stream

We have not audited Business Stream's methods of dealing with complaints. We did note that very few telephone complaints were recorded by Business Stream in Line B4.29. While there is a complaint code on Hi-Affinity we understand that Business Stream do not encourage their advisers to complete it. When the adviser is unable to deal with the complaint over the phone they advise the caller to submit the complaint in writing.

Telephone calls (Scottish Water and Business Stream)

Telephone calls are logged on the "Symposium" telephone system. In addition BT records all calls by site and date.

Scottish Water currently has 60 Business Stream and 105 domestic incoming customer service lines which imposes no restrictions on the system. These are operated under an Service Level Agreement.

Nearly all the information reported by Scottish Water in the telephone contacts section of Table B4 comes direct from the system and, subject to any detailed comments below should be robust.

Scottish Water tries to log all contacts onto Promise (Customer contact System) and Hi Affinity. Last year we noted that approximately 10% of all the incoming calls were transferred. Of these approximately 25% were internal transfers where customers had rung up on the wrong number and had therefore been answered by the wrong team. Pre the split Scottish Water gave us comfort that they were not double counted on Hi Affinity and Promise. Post the split this continues. When there is more than one retail organisation guidance should be given as to whether these transfer calls should be logged on the two contact systems. The remaining 75% were transferred out of the department elsewhere in Scottish Water. The telephone system is unable to identify easily the destination of these calls but discussions with customer representatives at the time indicated that many were transferred to Developer Services (new connections), whose calls go through the call centre. This year more limited data is asked for and this is less obvious. We assume that this discrepancy continues.

Calls that are transferred between Scottish Water and the Business Stream will be counted in both sets of statistics in Table B4 – Telephone Contacts.

Scottish Water uses BT's Message Manager system during emergencies, of which there are several every month. These are correctly included in the return but are not included in the direct download from Symposium. At the end of any emergency the Message Manager system is "switched off" by Scottish Water. At this time Message Manager reports the results over the phone to the member of Scottish Water's staff concerned. The information is recorded on a spreadsheet and the result added to the Symposium figures for the reporting period. We have reviewed the spreadsheet which appears to be well kept and updated. However the information is not a direct download and depends on the staff member correctly filling in the data.

Septic tank emptying

Septic tank emptying is administered by a small Operations Management Centre (OMC) team which operates separately from the main customer service section.

Scottish Water operates 3 levels of service with differing charge rates:

1. Contract emptying to an agreed programme. Here the team identifies the programme for the month and contacts the customer with a provisional date.

2. Unscheduled emptying, which has a response time of "endeavour to respond within 28 days".

3. Urgent emptying with a 48 hour response time.

The team regularly accesses Promise to see if any new requests have been received. These are then recorded on the Gemini database, a commercial tool used for controlling tanker movements. It was noted at audit that this is not an automated process and is subject to delay (some jobs are not entered on the Gemini database immediately, and therefore have not been carried out on schedule). The team prints a job sheet and faxes it to the tanker driver. When the job has been done the tanker drivers complete the sheet and either fax it or post it back to the team who update Gemini. Because of possible errors in querying Gemini the team does not use Gemini as a chase up tool, relying on the tanker drivers to do their job or customers querying delays. .

The team prepares the statistics for lines B4.30 to B4.40 monthly, relying on the correct filing and analysis of the paper records. Because the work is done monthly and separately for the 4 main operating areas plus the Western isles and Shetland the analysis of the paper records is not unduly onerous.

While we believe that the reported figures are likely to be reasonably accurate (subject to our line comments) we believe that Gemini is likely to be a more effective tool both to ensure that jobs are actively managed to completion and to analyse the information for the annual return. We recommend that Scottish Water reviews the queries used for interrogating Gemini and works with the team to ensure that Gemini can report jobs that have not been completed but are nearing their promised date.

We also recommend that the jobs should be transferred from Promise either automatically or in a more timely manner to enable better planning of work. We recommend that a checking process be put in place for jobs sent out to the drivers and jobs returned complete. We understand that there are future plans in place to introduce handheld devices to automate the work issued to and returned by the drivers. In addition Scottish Water are considering putting a system in place for logging drivers loads at WWTW, which could be sent automatically back into Gemini. These initiatives should do much to improve the current system.

Comments by Line

Lines 1-7: Billing charging and metering enquires are downloaded for the year directly from Hi-Affinity.

Pending enquiries are not recorded and we are unsure of their materiality, both in number and type.

As for previous years enquiries about new connections are not recorded in these lines as they are diverted to developer services and since the split are dealt with by Scottish Water. We believe that this is correct as they do not relate to metered accounts.

The figures are significantly lower than last year. Scottish Water reports that this is due to the data cleansing exercise which resolved many outstanding issues with its customers.

Lines 8-14: Change of payment enquires are also generated by a direct download from Hi-Affinity.

Pending enquiries are not recorded and we are unsure of their materiality, both in number and type.

The responses again show a significant decrease from the previous year, possibly again due to clarifying options through the data cleansing exercise and the completion of Scottish Water's initiative last year to move customers to direct debit payments. Scottish Water reports that these contacts may increase again next year as the metering programme accelerates and unmeasured customers are told their options about moving to a metered tariff. When metered, unmeasured customers will have to move to a metered tariff in April 2010. However, if a metered tariff would result in a lower bill Scottish Water will offer this option immediately. If this option is not taken up because the metered tariff is larger Scottish Water will increase the tariff each year until the full tariff is in force in April 2010.

Lines 15-21: Written complaints have decreased by approximately 10% over last year. Scottish Water notes that its "promise to resolution" initiative helped to reduce the number of written complaints. The number of complaints

dealt with in 10 days has slightly deteriorated from last year (98.7% compared to 99.8%).

For the numbers of written complaint correspondence in Line 15a Scottish Water has used generated the information by adding linked contacts to the original contact. This facility is not used on Hi-Affinity and so the Business Stream has entered the original contacts again in that line. Given that Business Stream contacts are low any missing additions is likely to be barely material and certainly within the confidence grades reported.

Lines 22-29: The information in these lines comes from 2 sources:

- Information directly generated by the telephone system, which should be accurate.
- Information from BT's Message Manager system. Here the statistics are read over the phone from Message Manager when it is switched off and entered into a spreadsheet by the operator. The spreadsheet appears to be effectively managed but any system which requires an operator to input data under the pressure of normal work could omit some calls. We suggest that Scottish Water investigates whether an "end of year" overall report could be obtained from BT.

In the second half of the year calls transferred from Scottish Water and the Business Stream and visa versa will have been counted twice.

Line 28, abandoned calls, includes when the person phoning realises that he has called the wrong number and hangs up.

The number of calls received has reduced by 19%. This is a very significant reduction. Scottish Water reports that it did not have the levels of hydrant problems this year that caused high levels of calls in the summer of 2005. Also activity on the distribution system is much lower this year. Scottish Water also reports that it is supplying a better service which is also a cause of reduced contacts.

Calls abandoned have significantly fallen from 3.4% to just under 1.0% as well as calls answered within 30 seconds (82.7% to 97.2% , a good result, although last year Scottish water reported that calls abandoned last year was high due to two major incidents plus the very high numbers of calls over the summer period reporting the consequences of hydrant misuse.

Lines 30-40: The return indicates an almost threefold increase in requests for emptying compared to the previous report year, but only a 25% increase in those carried out since last year.

Pre-planned (or Contract) emptyings have increased by 30%, and emergency emptyings by 5%. There is little change in the number of ad hoc emptyings.

The two small septic tank emptying operations in the Western Isles and the Hebrides have been included in this year's return.

Comments by Confidence Grade

Scottish Water has assigned A1 grades to "Billing/Charging/Metering enquiries and Change of payment method enquiries. We see no reason why the contact information should not be accurate, as reflected in the A1 grade, although we are unsure of the approach that should be taken concerning pending enquiries. We believe that the use of the "I" code has been properly handled on Hi-Affinity this year but complete confidence can only be established when internal workflow in the Business Stream is removed from Hi-Affinity.

For new written complaints Scottish Water has moved its confidence grade from a B2 to an A2. We believe that the new grade reasonably reflects the situation in the year. Total numbers of written complaint correspondence has been given a confidence grade of B4. Given that the Business Stream does not link follow up correspondence we believe that this confidence grade is reasonable.

We accept the confidence grade of A1 for the information on telephone contacts even though there is some scope for error around the Message Manager data. However, the system appears to be well managed and we have no grounds to think that the information is not accurate.

We believe that the confidence grade assigned by Scottish Water to septic tank emptying is generally reasonable for a paper based return and the possibility that a small number of records may be missing. We recommend that Gemini is reviewed to see if it can provide the information in future years.

5.7 Table B7: Customer Care – GMS Performance

Commentary by REPORTER

Introduction

Key points:

- The information presented in this table has generally been derived from the same sources as the other "B" tables.

- From January 2006 GMS payments for general billing enquiries, change of payment enquiries, meter application and response to a complaint are reviewed and a decision is made whether to make a payment. Previously payments were made only if a customer claimed.

- Financial information has been obtained from Scottish Water's financial accounting system (Peoplesoft). As reported last year individual GMS payments continue to be recorded either under either a single GMS cost centre code or an ex-gratia code. For several years we have noted that these single codes for GMS payments was inadequate, with free form descriptions and amounts paid being the only things that could be used to allocate GMS payments to the correct lines in the table. Inconsistency in the descriptions sometimes makes it difficult to correctly allocate payments, although most payments can be reasonably inferred. Scottish Water has recognised that the current method leads to errors and last year developed a possible coding system to ensure that GMS entries on Peoplesoft are accurate. However, this was considered to be too complex and has not been implemented. We continue to recommend the implementation of such a system.

- This year we audited a very small sample of 10 GMS payment cheques to ensure that they had been paid. We audited all to Scottish Water's Bank account confirming that they had been cashed.

- We note that cheques are generally returned to the person who requested the cheque for final dispatch. There is no central checking that GSS cheques have been dispatched. Given that Accounts Payable receive all cheque requests and generate all cheque number references we recommend that Scottish Water considers setting up a system in Accounts Payable or elsewhere where the bank account is regularly monitored to see if GMS cheques have been cashed. We accept that there can be a number of reasons why cheques are not cashed or encashment may be delayed. Nevertheless the non encashment of a cheque after a reasonable period could be used to check that the requester of the cheque has dispatched it.

Comments on Methodology

The methodology for preparing the base information (much of which has been drawn from other tables) has been discussed in our narrative for Table B4.

Financial information has been obtained from Scottish Water's financial accounting system (Peoplesoft). As for last year we noted that Peoplesoft does not have the necessary coding system to ensure allocation of payments for all categories. Free form descriptions again have had to be used for final allocations and these were not always in sufficient detail to allocate expenditure with surety. We accept that many can reasonably be inferred. Scottish Water has recognised that the current method leads to errors and last year developed a possible coding system to ensure that GMS entries on Peoplesoft are accurate. However, this has not been implemented to date and we continue to recommend the implementation of such a system.

Comments by Line

The number of planned interruptions is down from last year, mainly due to the reduction in planned activity on the water network. The number of GMS failures claimed are up on last year but given that the payments have to be claimed it is difficult to read anything special in the variation. The information for unplanned interruptions shows little change from last year, although payments are up.

Sewer flooding incidents are significantly reduced from last year (36% of last year's total). However, the number of payments is up by 50% with the amount paid increasing by 80%.

Payments for failures to deal with billings contacts and customer complaints are significantly reduced this year. We believe that this results from the emphasis that Scottish Water are putting on the OPA this year. In particular all responses are targeted on a 5 day response and most staff that we have talked to show their recognition of the importance that the organisation puts on the OPA.

The number of appointments made has gone up by 2.6 times this year. This is because NSO appointments have been included this year. In previous years only customer relations visits were included. Failures have gone up 4.7 times but this may be a reflection of additional pressures on managing the increased programme.

The most significant GMS payments were ex gratia payments, mainly additional payments for property damage as a result of a mains bursts or sewer flooding. There is a reduction in number from last year although the amount paid out is up. Overall there has been a significant increase in ex-gratia payments since 2003/4.

Scottish Water reports that GMS payments for "change of payment method enquiries" are included in Line B7.32 due to the difficulty of allocating payments as described under their methodology. We understand that the single payment reported in that line is a misinterpretation. Scottish Water gives further details in its narrative.

Comments by Confidence Grade

The confidence grades of the base data generally reflect those in the other tables where we have already commented.

Payments abstracted from the financial accounting system have been given a B3 grade. Last year we suggested that a B4 grade would be more appropriate. We acknowledge that additional information that helps to identify the type of contact is available on Promise and Hi-Affinity and therefore we accept the B3 grade this year.

5.8 Table B8: Outputs to Customers – Other Serviceability Indicators – Water and Sewerage Service

Commentary by REPORTER

5.8.1 Lines B8.1 to B8.9 – Water Service –distribution and water treatment works performance

Introduction

Key Points

- "Mains bursts per 1000km" is calculated from the total bursts reported against line E6.19 divided by the total length of mains reported in Line E6.16.
- Water quality compliance sampling and testing is undertaken by Scottish Water to a regime which is monitored by the Drinking Water Quality Regulator (DWQR). Scottish Water's test laboratories are accredited with a recognised UK body for the testing work undertaken.
- Relevant sections of the water quality report reconcile with the Annual Water Quality Report 2006 prepared by Scottish Water.
- The reported data on turbidity is taken from the results of regulatory water quality sampling and testing undertaken by Scottish Water and reported to DWQR. Data for AR07 covers the 2006 calendar year and is consistent with the Annual Water Quality Report 2006 prepared by Scottish Water.

Comments on Methodology

Mains bursts per 1000 km

The methodology used for reporting mains bursts is as for AR06. The data for the report year comes from two sources. The majority of data relates to Scottish Water's activity and is extracted from the WAMS/Ellipse database. This arises mainly from active leakage control and partly from customer reports of leakage. In both cases the work is carried out by external contractors managed by Scottish Water. Prior to August 2006 some active leakage control work was carried out by SWS. Information on the latter comes from a separate database provided by SWS.

WAMS jobs are raised for all burst repairs carried out by Scottish Water. This is done from a hand-held device in the field after investigation. 8 WAMS work order codes, with 4 descriptions, relate to mains bursts. The descriptions are as follows:

- repair burst <150mm
- repair burst >600mm
- repair burst 150 to 300mm
- repair burst 300 to 600mm

At this stage the work has not yet been carried out and in some cases it is found that the pre-selected work order code does not correspond to the work which actually needs to be done. Previously feedback on work actually done was by free text entered onto the hand-held device which could be difficult to relate to work order codes. Scottish Water is currently implementing mandatory resolution codes for fieldwork which will improve the accuracy of work order codes. For reporting purposes work order codes with the above descriptions are selected from WAMS. The data is then cleansed to remove duplications and coding errors.

The SWS legacy database is also reviewed and any duplication with WAMS is filtered out by manual checks. Prior to August 2006, some areas within Scotland had leakage targets incorporated into a programme of proactive leakage work managed by SWS. Where bursts were detected as part of this work, they could be repaired either by SWS or Scottish Water teams. It has been assumed that all Scottish Water repairs have also been recorded by SWS and the number excluded from the total.

Where bursts are repaired on an emergency basis work order codes are raised retrospectively when the work is complete.

Bursts are allocated to areas by use of address-point co-ordinates, reconciled to DMAs using GIS.

Two improvements to the methodology should reduce the extent of data cleansing required so that the accuracy of the data is improved for future years. These are:

- the use of mandatory resolution codes for field-work; and
- the bringing of all burst repair work into a single Scottish Water-managed process.

These changes may warrant an improvement in confidence grade in future years.

Water Treatment Works Turbidity

Water quality sampling and testing is regulated under the Water Supply (Water Quality) (Scotland) Regulations 2001. These establish a sampling regime by calendar year. The Annual Return reports data for the 2006 calendar year.

Water quality compliance sampling and testing is undertaken by Scottish Water to a regulatory sampling schedule agreed with the DWQR. Sampling and testing is undertaken by Scottish Water's Scientific Services, who are accredited by a recognised UK accreditation body. The sample information and test results are recorded on Scottish Water's corporate Laboratory Information Management System (LIMS). The results are subject to audit and review by DWQR.

The data reported in the Annual Return is generated through a query on the LIMS data. Each year Scottish Water prepares an Annual Water Quality Report to DWQR. During the audit Scottish Water provided a copy of the Annual Water Quality Report and we were able to reconcile relevant figures in the Annual Return with the figures in the Annual Water Quality Report 2006.

The methodology for the preparation of lines B8.2 – 8.9 closely follows the detailed methodology defined by WIC. This results in a significant number of WTWs being excluded due to small numbers of samples being taken in the year, consistent with the status of the WTW. These are mainly smaller sites, which are now the focus of investment by Scottish Water. In a change from previous practice, the data-set used for AR 07 includes only samples taken for regulatory purposes and excludes samples taken for operational reasons.

The methodology requires "non routine" samples to be excluded. Where regular operational samples are taken at works where there are insufficient regulatory samples to make up a dataset we believe that routine operational samples should be included. We are not aware whether these conditions apply at any of Scottish Water's excluded works.

Comments by Line

Line B8.1: The reported number of bursts per 1000km of main shows a further reduction of 11% when compared to the figure for AR06.

Lines B8.2 – 8.9 Comparison with previous years is not possible as turbidity was reported as a banded percentage compliance with the compliance value.

Comments by Confidence Grade

Line B8.1: The number of bursts comes from the WAMS/Ellipse database and the proactive leakage database operated by SWS. Until the reported numbers show less variation giving confidence that the new reporting is robust the confidence grade of A3 seems reasonable.

Lines B8.2 – 8.9 The assessed confidence grade of A2 is considered reasonable.

5.8.2 Lines B8.10 to B8.19 – Sewerage Service – sewerage and sewage treatment works performance

Introduction

Key points:

- The total sewer length used in lines 11 and 16 includes laterals.
- Scottish Water has the ability to digitally map blockages and collapses. All the data is related back to the address of the problem, which in turn is linked to an asset and given x and y coordinates.
- Historical data has been consistently available for blockages since Scottish Water was formed, but the quality of data is variable. Historical data is available prior to this, but again is of variable quality.

- Scottish Water stated that the terminology for total number of collapses could be improved: failures, bursts, fractures and collapses would be an improvement. It is our view that pumping main failures should be reported separately from sewer collapses as sewers and rising mains exhibit very different characteristics.

- Scottish Water stated that it would be useful for data on laterals to be included in a separate table to enable an easier comparison of its performance with those in England and Wales.

- There have been 60 unsatisfactory intermittent discharges resolved in the report year. Of these 25 were Q&SIII, 13 of which were removed due to schemes, with the remainder being removed due to a desk top assessment only. 35 were from Q&SII, all of which were removed due to schemes. In addition 5 of the Q&SII projects are now on the Q&S3 list for a different problem.

- Equipment failures include failures at sewage treatment works. The company has not applied any materiality limit to the equipment failures report. The report includes failures which might not have had a detrimental impact on customers or the environment.

- The company has complied with the detailed analysis set out in the reporting requirements to calculate sewage treatment works performance. We note that the measure adopted might not fully reflect the impact of investment over time.

Comments on Methodology

Sewer Collapses

The methodology for the total number of sewer collapses is as per Table E7 last year.

Data for Scotland as a whole is obtained via the WAMS/Ellipse database. It should be noted that only collapses that cause service problems severe enough to cause a customer to contact Scottish Water are reported. This database contains work orders for sewer squads involved in sewer investigation, reactive maintenance and repair. The work orders thought to cover sewer collapse have been collated to determine the total collapse figure for this year. The initial data search is for jobs raised in the period 01/04/2006 to 31/03/07, but then any jobs that are not shown as completed are excluded. Scottish Water estimate that this methodology results in a 1 to 2% under reporting of the numbers of collapses. The methodology should be reviewed so that any collapses not included in the report year are picked up in subsequent years.

WAMS is used as the base data and a series of queries is run on the data to select those WAMS codes and work descriptions that Scottish Water considers to be sewer collapses.

There are 14 work order types that refer to different types of collapse and these types have been used to determine the collapse figures. Additional codes were added to WAMS to identify damage caused by third parties and cancelled jobs. Jobs may be cancelled because the problem is found to be, for example a blockage and not a collapse.

The work orders are attached to addresses not assets. The address is generally the address of the customer reporting the problem. The system generates a location code based on the address and this code is then used to allocate problems to report areas. Any reports without location codes are spread pro-rata across the operational areas. In order to prevent double counting for different squads attending the site (for example, for inspection, repair and clean up) work orders at the same postcode within a three-week period have been counted as one collapse. Those that Scottish Water has noted are caused by third parties or relate to cancelled jobs are removed. Duplicate jobs are removed. Scottish Water considers a duplicate job to be those that appear at the same location within 21 days of each other. There is a final check on the data that the total in the WAMS database minus those removed above adds up to the number reported in the table.

The reported numbers include collapses on laterals. The codes in WAMS do not specifically identify bursts on rising mains. Numbers of bursts are identified from notes entered into Promise. We recommend that Scottish Water reviews its coding system to improve data quality.

There is currently no resolution code in WAMS to select between sewer rising mains and gravity sewers. When completing Line 17 Scottish Water traced back entries in Promise which referred to sewer rising main problems and compared them with the collapse list.

Scottish Water states that the improvement in data this year will be due to their improving data entry on handheld devices. However, there are still issues with incomplete data from the hand held devices, which are being addressed.

Blockages

The base data used to identify the number of blockages in the year was taken from the Scottish Water's WAMS job management systems and PROMISE customer contact system. Most blockages are reported by the public and so are first recorded on the Promise customer contact system. Scottish Water found that the some "resolution codes" used to categorise contacts were missing. For customer contacts with missing resolution codes, the methodology for determining the assumed number of blockages and equipment failures repaired, when a contact has no resolution code is the same as for flooding incidents due to blockage, as discussed in the report for table B3. The PROMISE system is a centralised customer contact system covering a wide range of customer contacts. The contacts are coded in a structured way which allows particular contact types to be recorded and the system to be interrogated.

Site squads use handheld devices to complete tasks and fill out choke forms which determine the cause of the problem and on which sewer it occurs. As described in table B3 there are issues with missing resolution codes and again Scottish Water have carried out a data uplift procedure to assign unknown information in proportion to that which is known. The figure for the total number of blockages is therefore complied from known and assumed data.

This year's data was not available at the time of audit. Scottish Water uses a series of queries to get the required data from the PROMISE database. The site squads resolution code description of the job is used as the basis for determining whether the record relates to a blockage or not. All problems are related to the address and listed as the nearest asset to this

address (20m distance). The bulk of the information is entered on handhelds, although there are still some situations where paper forms are used. Resolution codes are not always completed as there is no forced validation on the handhelds as yet . Scottish Water intends to improve compliance with a program of compliance monitoring and a training and awareness programme.

Scottish Water has noted that its new Information, Data and Reporting group is charged with making material improvements to the robustness and confidence in collapse, blockage and sewer flooding information.

As discussed in Table B3, improvements in the data from PROMISE for 2006/07 are based on part year data only, as the customer contact information was improved due to improved question and answer information from September onwards.

Total Sewer length.

Scottish Water has stated that the total length of sewers is based on the total length of sewer in GIS plus an assumed further length of 1000km of main sewer to represent those that exist but are not yet in the asset inventory plus a further allowance of almost 16,000 km of lateral sewers which are assumed to exist but are not included in the asset inventory. This is the same methodology as for last year's annual return. The methodology for this is discussed in the report for Table H4. These figures are consistent with those in Tables H4 and E7. Scottish Water stated that the blockages and collapses occurred on both laterals and main sewers. They also stated that most blockages occurred on laterals.

Intermittent Discharges

The number of intermittent discharges reported includes CSOs, Emergency Overflows (EO), overflows from WWTW storm tanks, surface water outfalls and dual manholes, which contains both storm water and surface water sewers and so can operate as a CSO. The estimate for dual manholes is not the number of dual manholes themselves but rather the number of areas which are known to contain dual manholes and where there is a known problem. The data is derived from Ellipse. Ellipse is updated by asset planner knowledge and DAS study information.

There has been a data harmonisation study between Ellipse and Corporate GIS to identify those IDs which do not exist, or which have been abandoned. The figures that make up the lines in Table B8 are shown in the table below and come from 2 sources:

1. Ellipse/GIS
2. A separate spreadsheet which details dual manhole areas and surface water outfall data

Scottish Water proposes to merge the spreadsheet with the corporate system for the next return.

Item	Total	Total Unsatisfactory	Notes	Q&SII removed	Q&SIII removed
All intermittent discharges	3508	844	Unsatisfactory IDs from the list agreed between SEPA and Scottish Water for Q&SIII		
For the return split as follows					
CSOs : CSO & Combined CSO & EO	3088 (3900 in 05/06)	769 (813 last year)	Reduction since 2005/6 is due to data cleansing and abandonment. The figure of 3088 does not agree with the figure of 4375 reported in Table E7 Line 22. The number of unsatisfactory CSOs was reported last year as 813; the number this year is 769. The reduction of 44 is 33 on Q&SII resolved list and 11 on the Q&SIII resolved list.	33 UCSOs removed by 20 schemes	10 UCSOs removed by paper exercise 1 UCSO removed in Q&S3 programme
CSOs at WwTW and Eos etc	420	75	From the breakdown of data it would appear that the number of EOs and CSOs at WwTW totals 420, of which 75 are unsatisfactory		
Excluded from the return					
Dual manholes	46	33	These are excluded in the table by SW as they are not included in the WIC definition.		13 Dual manhole areas have been de-dualled
SWO	45	38	These are excluded in the table by SW as they are not included in the WIC definition.		

In the past year 35 unsatisfactory CSOs have been removed under Q&SII and 25 have been removed under Q&SIII. Of these, 12 were due to a desk study and the rest were due to a number of physical schemes.

We looked at backup information for 3 of the UIDs which had been removed due to a desk study rather than a scheme and found that the removal was based on DAP reports which stated that the models did not predict spills at the CSOs in question.

Equipment failures

Scottish Water identifies the total number of equipment failures repaired from work order information on the corporate Works Asset Management System.

The data set which forms the basis of the reported data is limited to the following:

- Reactive maintenance work orders only. The data excludes planned maintenance tasks such as scheduled oil or parts replacement.
- Work orders closed in the report year. The task closed date is the date the work was complete as opposed to the date completion was entered on the WAMS.
- Work orders for operational tasks. Other categories of tasks associated with capital works or rechargeable tasks are identified and excluded from the return. Work on associated faculties such as the fence line around a pumping station or work on a pumping station superstructure are covered by a separate system and are not included in the return.
- Work orders which are tagged as complete on the WAMS system. Other tags are available to identified work orders deferred or cancelled.
- Failures on Scottish Water assets. The report excludes equipment failures on PPP assets.

The equipment failures reported are those which cannot be rectified by the operators on site and make it necessary to raise a work order to call out a maintenance team. The company cannot separate out works orders which result in a repair from work orders which require some minor intervention such as resetting a trip switch.

The vast majority of equipment failures reported for the sewerage system is related to pumping station failures. Blockage of the pump is counted as an equipment failure.

Work orders are allocated to assets, allowing failures to be categorised by asset type. The main categorisation is the by site, for example, a pumping station, a sewage treatment works or CSO. As work orders are created, asset information is selected from defined lists which can be cross referenced to the asset inventory and financial cost centres and accounts. More detailed asset information is available which could allow failures to be coded at a more granular level of asset. However, this is optional and generally not used.

There is no resolution coding to confirm that the problem as defined was the problem resolved by the work carried out. For example, during our audit we noted that a number of CSO asset failures were spills due to blockage of a pump in the associated pumping station.

During our audit we were able to inspect reports of monthly equipment failures totalling to the reported figures. These showed reasonably stable trends over the year with some fluctuation exacerbated by holiday periods. The year start and year end figures (April and March respectively) were consistent with other months suggesting that data is not lost at month end. During our audit we noted operational procedures in place to monitor, prioritise

and expedite progress on work orders and data returns which give confidence that the report data is complete. However, it is possible that the work orders completed in the year will not have been updated on the WAMS system at the time the data is generated. We suggest that Scottish Water considers rerunning the 2006-07 report during the 2007-08 Annual Return process to confirm any under-reporting of data.

The report includes failures on sewage treatment works, sewage pumping stations, CSOs and other sewerage structures. The associated block of lines and the associated line definition generally refers to sewerage rather than sewage treatment assets. We understand that sewage treatment works are not included in equipment failures reported to Ofwat by companies in England and Wales. Ofwat's reporting definitions for England and Wales are prescriptive in the types of equipment to be included in the report. We suggest greater clarity of definitions in this respect.

Definitions of the equivalent data definition in England & Wales limit reported equipment failures to those which had or are likely to have a detrimental impact on service to customers or the environment. We suggest discussion between WICS and Scottish Water to agree a definition of materiality which is consistent with reports in England and Wales.

The Ofwat reporting guidelines for England and Wales is encouraging companies to develop and report on their own serviceability indicators for sewerage non-infrastructure maintenance. This accepts that companies have differing views on what is important to them and therefore the types and level of detailed information recorded. The common aim is to develop indicators which:

- Can be reported consistently over a period of time.
- Which informs potential change in the likelihood of service failure.
- Closely aligns with the metrics used by the company to inform its Board on the ongoing state of its equipment.

We suggest that WICS monitors this approach and considers whether a similar approach is appropriate for Scotland.

Sewage treatment works performance

The company has based its analysis on all sewage treatment works where there is regulator sampling data in the last three years. This includes all PFI works.

The company has based its analysis on either the 95%-ile parameter of 2 tier consents or the consent parameters for single tier consents. The consent parameters used are those prevailing at the time the relevant sample was taken. The analysis has taken account of changes to consents over the relevant years.

The sample data used in the analysis is information obtained from SEPA for regulatory sampling in the calendar years 2004, 2005 and 2006. The company has rejected annual works data sets for a parameter where there are less than six sample results in a year.

The company has excluded UWWTD consent limits from the analysis even when these are more onerous than the other consent or licence conditions prevailing at the time.

We have checked the company's calculation for two works and believe that the analysis complies with the detailed reporting requirements.

A works which has events forecast for in one event category may have events forecast for another event category. If this is the case, Scottish Water has reported the works in both categories.

Overall, we note the analysis will not necessarily reflect the impact of improvements either for asset maintenance or quality enhancement. If a works at significant risk has been upgraded under the asset maintenance programme, the prediction of events will be based on historic performance and it will take three years for historic failures to be taken out of the analysis. If a works is improved to meet a new an onerous consent, it is possible that the mean performance of the new works against consent will deteriorate. We note the need to consider these issues when using these parameters to monitor treatment works performance.

Comments by Line

Line 10: The methodology for determining sewer collapses is the same as for AR05, and AR06, with data being obtained via the WAMS/Ellipse database. The work orders are attached to addresses not assets. The address is generally the address of the customer reporting the problem. This number is the same as that reported in Line E7.14 and has increased from 2468 in AR06 to 2754.

Line 11: The sewer length calculation is as per Table D6.

Lines 12, 13: This is the number of intermittent discharges which cannot be directly compared with last years UCSO figure. This year the figure contains CSOs, EOs, combined CSO/EOs and STW overflows. Last year the figure included CSOs but excluded EOs and STW overflows. These changes are consistent with WIC's definition requirements.

Line 14: This is a calculated field.

Line 15: Last year the total no of flooding incidents due to blockages was reported in Table B3 as 581. The number of blockages was not reported in Table B3. The methodology for determining the number of blockages is discussed above and follows the process used to determine figures for sewer flooding in Table B3. The number of blockages is reported as 11134.

Line 16: Based on the number of jobs recorded on the work planning system, WAMS.

Line 17: Scottish Water does not have the facility within WAMS to identify rising main failures. The estimate is based on site reports and comments within Promise.

Line 18: B8.10 minus B8.17.

Line 19: The methodology is commented on above. The reported data includes sewage treatment works equipment failures. The company includes minor work such as resetting a switch in the reported data.

Line 20-37: We believe that the company has analysed regulatory sample data and works consent data in accordance with the reporting requirements. We have commented on the methodology adopted by the company to analyse the data above.

Comments by Confidence Grade

Lines 10 and 11: We agree with the confidence grade of B3.

Lines 12 and 13: Scottish Water considers that the data has improved since last year due to the harmonisation program and return a confidence grade of B3 which we consider reasonable.

Lines 15 and 16: We agree with the confidence grade of B3.

Line 17: We consider that a grade of B4 is probably more appropriate.

Line 18 We agree with the confidence grade of B3

Line 19: The data set is derived from a single corporate data set used to manage reactive and planned maintenance. This limits the data to equipment failures which could not be resolved by operational teams on site and required them to call out the maintenance team. The controls on reactive and planned maintenance gives reasonable confidence that work is only undertaken in response to work orders on the corporate system. On this basis a B3 confidence grade is reasonable. However, we note the inclusion of sewage treatment works equipment failure and the inclusion of all failures, including those caused by blockage or those requiring resetting of a switch.

Lines 20 – 37: We believe that the confidence grade reported by the company is a reasonable reflection of the source data and the analysis carried out. We note that the analysis is backward looking – it estimates the probability of no events in the last three years. It is not necessarily forward looking and does not reflect the impact of investment and the company's response to works failures. We would ascribe a lower confidence grade if to the data as a prediction of future events.

5.9 Table B9: Security of Supply Index

Commentary by REPORTER

Introduction

Key points:

- We believe that the information presented by Scottish Water in this table gives a reasonable representation of the resource situation in Scotland under current legislation but more development is required. While likely future reductions in abstractions under the Water Framework Directive have been taken into account in the analysis in Scottish Water's Water Resource Plan, Scottish Water did not consider that it was appropriate at this time to include it in the SOSI calculation until SEPA has fully signed off the analysis. Further changes are therefore likely as SEPA agrees final licences over the next two years.

- Scottish Water is currently working closely with SEPA to develop the full water resource plans by April 2008, which should further improve the accuracy of the information reported in this table. Scottish Water produced its first Water Resource Plan (WRP) in April 2006 based on methodologies agreed with SEPA. The 2007 water resource plan updates the 2006 plan but emphasises Scottish Water's work to produce robust water resource plans in April 2008.

- While Scottish Water's levels of service have been discussed with SEPA, the Scottish Executive has yet to formally agree them.

- Even though Scottish Water has not produced water resource plans to the current level expected in England and Wales we believe that it has generally been developing its resource strategy in a well planned way, using industry standard methods, particularly for deployable output. Aquator in particular is a powerful tool for system modelling.

- Scottish Water has used a 3% increase in demand for the dry year critical period. This may be correct in Scotland but is lower than we have seen in England and Wales. We recommend that Scottish Water checks further to ensure that this parameter has been accurately assessed.

- Scottish Water is aiming to produce its WRP 2008 to industry best practice. In particular Scottish Water will be re-assessing outage allowance methodologies and target headroom methodologies.

- In some zones deficits are small and it is important that raw water losses and WTW losses are accurately calculated as they may be material to any investment decisions. We understand that Scottish Water is currently installing flow measurement on many of their intakes. We recommend that whenever possible Scottish Water monitors the difference between these meters and DI meters to better understand these losses.

- Scottish Water has produced preliminary optioneering studies for 33 water resource zones in deficit. Currently Scottish Water is aiming to produce preliminary

economic level of leakage (ELL) estimates by Dec 2007 but will not have final estimates available until Dec 2008. It is likely that investment needs will remain uncertain until after the draft business plan is submitted.

- In calculating deployable output Scottish Water has interpreted the definition of "water resource system" to include the capacity of the WTW. Thus in some resource zones available headroom is limited by WTW capacity. We are unsure if WIC wants WTW constraints to be included in this table. However, Scottish Water's interpretation does give a true picture of its ability to supply water to its customers.

Scope of the audit

We held two meetings with the staff of Scottish Water's Water Resource Group. We understood the basis of the current situation with water resource planning in Scotland. We audited the calculations going into Table B9.

Water resource planning in Scottish Water

Historically, since 1998 Scottish Water developed a methodology to assist in water resource planning. This involved developing Area Water Strategies and much of the information generated for Table B1 in previous years on the supply side comes from those studies.

In 2005 Scottish Water started working with SEPA's new Principal Policy Officer for Water Resources to develop a series of water resource plans along the lines of those prepared in England and Wales (SEPA and Scottish Water have worked together to simplify some aspects of the England and Wales specification). As part of this process, water resource plans were produced in 2006 and 2007. The plan for 2007 was published by Scottish Water at the end of April 2007.

The 2007 water resource plan is not a plan as currently interpreted in England and Wales but rather a statement of progress towards producing a set of water resource plans in April 2008 that will be to a similar specification to those now being produced in England and Wales.

As a priority Scottish Water is studying the impact caused by implementation of the Birds and Habitats Directive and the Water Framework Directive at 78 named water resource zones. However, these studies will only resolve the impact of the directives and growth and not necessarily resolve existing level of service problems. In some cases, interventions to meet the directives may also resolve or improve the supply demand balance deficit but it cannot be stated categorically that this will be the case for all 78 water resource zones.

Scottish Water has also produced "optioneering studies" for 33 water resource zones in deficit. Not all these zones are in the 78 named zones. In parallel to the work on the water resource plans Scottish Water is currently working to produce a preliminary Economic Level of Leakage (ELL) in April 2008 and a final ELL in April 2009. Until this is done any optioneering study can only be considered to be preliminary. If a final ELL is not available until April 2009 there is likely to be uncertainty in the investments needed for water resources stated in the draft business plan.

Current work has been incorporated into the Security of Supply Index (SOSI) presented in tables B9a and B9c. Largely because of the difficulties in preparing yield calculations in its many water resource

zones Scottish Water has not prepared SOSI to the reference levels of service as for in Table 9b. These were levels of service suggested by the EA in England in 1997.

Methodology

Scottish Water's levels of service

Scottish Water has used its planned levels of service in tables B9a and B9c. These are drought orders every 30 years in rural areas and every 50 years in water resource areas with more than 50,000 people. The reference levels of service used in England and Wales are based on a drought order every 40 years but many companies in England and Wales have different planned levels of service.

Scottish Water reports that its chosen levels of service have been discussed with SEPA but the Scottish Executive has yet to formally sign them off. Until this is done Scottish Water remains at risk and it is important that this is done before the Business Plan (which will be based on the 2008 water resource plans) is submitted.

Numbers of water resource zones

Scottish Water has 239 water resource zones. This is double the total number in England and Wales and makes the work of producing water resource zone plans onerous for a single company.

Deployable output and water available for use (WAFU)

General

WAFU is defined as:

Deployable Output minus outage minus raw water losses minus WTW losses

Deployable output is either constrained by licences set by SEPA or by hydrological considerations or by WTW capacity.

Scottish Water has developed an industry standard yield assessment tool called "Aquator", which we have come across elsewhere. Aquator models the system and calculates water available for use (WAFU) at demand nodes (water treatment works). Scottish Water reports that about 80% of its yields have been carried out by Aquator, with the other 20% (of mainly small resource zones) being based on an analysis of rainfall data and other information using other "Low Flow Estimation Systems". The latter is based on rainfall as river flow data are not available. We reviewed a sample of the yield calculations as part of our work for the Q&SIIIa business plan. We believe that the work was done competently, using industry standard methods and modelling tools. In the smaller catchments it is not unusual not to have river gauging.

Scottish Water has undertaken a limited programme of additional river gauging since 2002. A Flow Gauging Strategy has been developed and agreed with SEPA. This will develop a number of strategic and site specific gauging sites until 2010, in order to improve confidence in yield and low flow estimates. Initially this will target 12 zones identified through strategic studies, but will also be used

to improve supply data for zones with water quality drivers. This work to date has been used to update deployable output calculations and incorporated into Table 9.

WAFU, as calculated by Aquator or the Low Flow Estimation System is then reviewed against available treatment capacity and the lowest figure taken. This is then further reduced for outages, raw water transmission losses and WTW losses.

Possible future reductions in abstraction licences as a result of the Water Framework Directive have not been incorporated into this year's SOSI calculation. There are likely to be changes as SEPA firms up its licence requirements.

In calculating deployable output SW has interpreted the definition of "water resource system" to include the capacity of the WTW. Thus in some resource zones available headroom is limited by WTW capacity. We are unsure if WIC wants WTW constraints to be included in this table. However, Scottish Water's interpretation does give a true picture of its ability to supply water to its customers.

Outages

As in previous years outages have generally been taken as 5% of WAFU with a few zones taken as 10%. While 5% is a reasonable figure, it is a weakness that site specific factors have not been addressed. Where zones are marginal, changes in outages can be material. Scottish Water reports discussions with SEPA on outage proposals are on-going with a view to applying an agreed approach at a number of representative zones across Scotland for inclusion in WRP08, thus improving present estimates.

For the critical period scenario, if the critical period has been assessed as the average day peak week, Scottish Water has assumed that planned outages would not occur as maintenance would be planned around them. It has also assumed that unplanned outages would have a very low probability of occurring in the peak week's demand. While it is true that unplanned outages are unlikely to occur during the critical period experience elsewhere suggests that it is possible. We recommend that, if not already doing so, Scottish Water analyses both planned and unplanned outages at its works to form the basis of the probabilistic assessment that forms current best practice.

Raw water transmission losses

Scottish Water has no information on losses in its raw water mains and for this year's SOSI calculations continues to apply its average leakage figure expressed as m3/km/day. This is significant in some smaller resource zones and may mean that some results may be overly pessimistic. Scottish Water has de-rated the average figure for pipe size and WTW size. However, the figure must be considered as uncertain. We note that under the WR5 driver Scottish Water is commencing to install flow monitoring at many of its inlets. This will continue up to March 2009. This should allow much better estimates to be made of this parameter and some data may be available for the 2008 water resource plan.

Water treatment works losses

Scottish Water has estimated WTW losses in most cases from an analysis of actual losses. These are at the high end of what we would expect. From the data sets that we have examined we noted one or two significant outliers to the general level of loss. We suggest that Scottish Water examines the reason for the outliers and considers whether they should be included in any calculation of average

losses included in other zones. The omission of the outliers would more reasonably reconcile Scottish Water's estimation of outage with our information.

Dry year distribution input

Average daily distribution input (DI) is used as the denominator in the headroom calculation. This year Scottish Water has taken the reporting year 2005/06 DI increased by 3% for a dry year as its denominator for the return to be consistent with the water resource plan 2007.

For the critical period table, Scottish Water has increased dry year annual averages or average day peak week by 3%. In our experience the resulting figure could be low in some cases and we suggest that Scottish Water reviews its DI records to check that this figure is appropriate.

Target headroom

Scottish Water has applied the 1998 probabilistic method for calculating target headroom. This has been done at the megazone level. The analysis results in current target headrooms of around 5% in the larger water resource zones of the Central Belt and around 8% in more rural and smaller zones. In our experience these results are not unusual, although we would not expect all small zones necessarily to have a headroom as high as 8% for the current year. Overall, we believe that the chosen headrooms are acceptable for the current calculations.

We note that an allowance for climate change has not been included. This is not an issue for this year's SOSI but in England and Wales this has significantly increased the target headroom allowance for later years. Also the impact of climate change for Scotland may be very different to that expected in certain parts of England and Wales. Currently the EA in England and Wales is considering whether to accept the latest estimates of the effect of climate change. This leads to uncertainty at the current time.

We note that Scottish Water intends to use the revised probabilistic method of 2003 in some selected appropriate large zones for its 2008 water resource plan. This will improve the estimate. However, with all probabilistic estimates the confidence limit used in the final decision is critical. It is important that both Scottish Water and SEPA agree what should be used. In England and Wales companies frequently use declining confidence limits for later years.

It is important that target headroom is carefully considered. Where demand is flat it may be the sole driver for investment.

Population

Water operational areas, which are consistent with water resource zones, are delineated on the GIS system. Properties within a water operational area are abstracted from the GIS system and multiplied by the average occupancy rate to give the population details in the tables. Unitary Authority occupancy rates were used but they were then given an overall adjustment to match the total population in households with water. We believe that the resulting estimates are acceptable for the SOSI analysis.

The SOSI analysis

We have reviewed the calculations of SOSI and believe them to be consistent with Ofwat's letter RD03/02. The number of zones in deficit appears to lead to a negative index. This indicates the large number of zones in deficit compared to most water companies. The results for the average year indicate that some 54% of Scotland's population are in deficit zones based on the planned level of service. The % will be higher when based on the critical period.

Interconnectivity of water supplies in the Central Belt has been assessed on current operational practice rather than in a dry year situation. As a result, the deficiencies in these zones may be overstated by the analysis.

Conclusions

We conclude that:

- Scottish Water has generally been developing its resource strategy in a well planned way, using industry standard methods for calculating deployable output. Aquator in particular is a powerful tool for system modelling.
- The SOSI calculation gives a reasonable indication of the current resource situation, but further development is required.
- Scottish Water has used a 3% increase in demand for the dry year critical period. This may be correct in Scotland but is lower than we have seen in England and Wales. We recommend that Scottish Water checks further to ensure that this parameter has been accurately assessed.
- Scottish Water is aiming to produce its WRP 2008 to industry best practice. In particular Scottish Water will be re-assessing outage allowance methodologies and target headroom methodologies.
- In some zones deficits are small and it is important that raw water losses and WTW losses are accurately calculated as they may be material to any investment decision. We believe that in some cases existing estimates of losses may be high. We understand that Scottish Water is currently installing flow measurement on many of its intakes. We recommend that whenever possible Scottish Water monitors the difference between these meters and DI meters to better understand these losses.
- Table B9 will continue to be subject to volatility as SEPA finalises revised abstraction licences over the next year or two and the impact of the Water framework Directive in abstraction rates are finalised with SEPA.

6. SECTION D – ASSET INFORMATION

6.1 Tables D1, D2 & D3 – Workload Commissioned Assets

Introduction

Key Points

- The report covers the value of assets reaching beneficial use in the report year. On rolling programmes of work this includes the individual assets commissioned in the report year.
- The reported information includes Q&S2 completion projects and Q&S3a projects.

Comment on the Company Methodology

In previous years the quantity and type of commissioned assets reported in Tables D1, D2 and D3 was compiled automatically from detailed data entered in tables G5 and G6. In the 2006-07 Annual Return, the format of G5 and G6 was changed to reflect Table C of the final business plan and no longer includes detailed information on commissioned assets.

For the report year, Scottish Water maintained the detailed procedures used to collect information on commissioned assets from project teams and other areas of the business. Data was collated and entered directly to tables D1 to D3.

Commissioned assets are generally projects with a beneficial use date in the report year. Where a project covers a rolling programme of work (for example asset maintenance or vehicle replacement) the quantity and value of assets completed in the report year are included in the return.

The reported value relates to the asset commissioned, including spend in previous years as appropriate. For rolling programmes reporting commissioned assets over a number of years, the value in the report year is consistent with the quantity of asset commissioned in the report year.

Requests are issued to project teams to return asset and cost information on commissioned assets using pro-forma data capture sheets. Assets are allocated to asset types which are consistent with the table line definitions.

Where investment in a treatment works results in a change of type, investment is reported against the revised asset type.

The project teams allocate costs across asset types based on detailed project cost data. This will exclude other costs incurred directly by Scottish Water and included in Scottish Water's project accounts. These costs are spread across assets in proportion to the costs identified by the project teams.

The costs are in money of the day. Prior year costs included in the commissioned asset value are not inflated to report year prices.

The value of commissioned assets is costs captured to the end of the report year, including any accruals or other provisions. It will not include any additional investment captured in subsequent years or the balance of accruals and provisions as actual spend is identified.

The company draws attention to its difficulties in capturing capitalised reactive maintenance costs and the asset quantities affected. It notes that steps have been taken to improve reporting in future years.

The company draws attention to the allocation of particular programmes of work and minor asset improvements within the tables. We have been able to confirm the allocation of these assets from the company's detailed analysis.

The reported information includes Q&S2 completion projects and Q&S3a projects.

Comment by Line

Lines D3.3-7:	The report tables do not make provision for a report of changes in asset stock for vehicles and plant.
Lines D3.13-16:	The report tables do not make provision for a report of changes in asset stock for other non operational assets.
Lines D3.27-28	The report tables do not make provision for a report of changes in asset stock for vehicles and plant.

Comment on Confidence Grades

The company generally reports a B3 confidence grade for this data. The analysis requires some allocation of expenditure between asset types and allocation of general costs. The company has drawn attention to weaknesses in the allocation of capitalisation of reactive maintenance. We believe that a B3 confidence grade is generally reasonable.

We suggest that a BX confidence grade would be more appropriate for zero returns to allow for the risk that some minor asset types will not be identified in the data returns.

6.2 Table D5: Activities - Water Service

Commentary by REPORTER

Introduction

Key points:

- Table D5 is a new table for AR07. Information on water mains rehabilitation and water resource planning was given in Table C7 in AR06, but owing to the change in information requirements, direct comparison is not always possible.

- The programme for new mains, mains renewal and mains refurbishment includes 33.6 km of mains with partial or total quality drivers (29.8 km new, 3.8 km renewed or refurbished). This represents 16% of the total length of mains added to the stock in AR 07.

- Most new mains are added as a result of developers' activity. The bulk of mains renewal is carried out by Scottish Water Solutions (SWS) and Scottish Water Capital Investment Delivery (CID), who are managed associate delivery partners (ADPs). Smaller lengths result from reactive operational activity.

- The whole of Scotland has not yet been assessed for the mains rehabilitation programme. The whole of the Q&SIII programme is scheduled to be at CAPEX1 (statement of need) approval by December 2007. Prioritisation is on the basis of condition and performance grades, with condition being based on remaining life and performance on performance against service criteria.

- The source of data for reporting on DMAs is Perform Spatial Plus (PSP), the Scottish Water leakage and DMA management system, which is updated from GIS on a batch basis when DMAs are completed and uploaded. Because of batch uploading PSP may not be fully up-to-date.

- Progress has been made during the report year towards increasing DMA coverage. In AR06 it was reported that 63% of the Scottish population was covered by a valid DMA. By the end of March 2007, the effective date for AR07, this had risen to 70%. Projects for DMA establishment were audited during audit of Table G6 and the recent run-rate of DMA establishment indicates that the target coverage of >90% by the end of March 2008 may be achieved, although this remains challenging.

- In the tables percentage property coverage is used as a surrogate for percentage population coverage.

Comments on Methodology

Mains Asset Balance

The source for data on lengths of mains renewed, relined, new-laid and abandoned is CAPEX5 forms submitted after completion of the work. The basis of length assessment is contractors' record drawings for contract work and WAMS work orders for reactive operational work. CAPEX5 approval is not given until record drawings have been received, so final payments (including developer cost contributions) cannot be released and this provides an incentive to the project manager to submit records promptly. Upon receipt, records are loaded onto GIS, so a lag may result between beneficial use of the mains and their appearance on GIS.

Information on communication pipes is sourced from weekly returns from CID to GIS for the mains rehabilitation programme and from WAMS for reactive operational work.

Data quality checks are run routinely before data are uploaded onto GIS. Any inconsistencies found are referred back to the originator through a quality-assured snagging system for resolution, with payments being withheld in the meantime.

Water resource planning

The status of DMAs is monitored and assessed as being in one of three categories and this information is updated on PSP on a daily basis. The categories are:

Category 1:	fully operable.
Category 2:	not reporting due to a transient problem.
Category 3:	problem requiring the DMA to be off line for some time.

Although DMA category is updated daily on PSP, other DMA data is not routinely updated after the initial entry. Consequently DMA data on PSP may become out of synch with the actual metrics over time. Scottish Water has begun a programme to routinely update PSP with DMA data. This should both aid accurate leakage estimation and improve regulatory information for the current year.

Details of DMAs are first delineated on the GIS system which is used to calculate details on properties and mains in the DMA. The information is then downloaded onto PSP, which uses Strumap, another commercial programme, to allow visualisation of the DMAs in the same manner as the GIS.

Within the year, 171 additional DMAs have been set up. The current figure of 1856 DMAs includes a number of TMAs (Trunk Main Areas). TMAs are different to standard DMAs:

- The TMA covers a length of trunk main which is metered at either end; it does not comprise a discrete area of many mains as a normal DMA.

- The trunk main may or may not have a small number of direct customer connections.

The fact that nearly all the DMAs are recorded on the GIS system should allow an accurate count of property numbers, used as a surrogate for population when calculating % coverage. We believe that the use of this surrogate is acceptable.

Comments by Line

Lines 1-8; In the initial version of Table D5 seen during the audit, a reconciliation of lines 1 to 8 showed that the length renewed (Line 2) had been added to the total of new mains to give the total shown at Line 8, without deducting the length of mains replaced by the renewed mains. This appears to have been the practice in previous Annual Returns and appeared to result in an overstatement of the length of new mains. This was challenged and during the period of the audit a revised version of Table D was produced, showing the length of renewed mains added to the balance at line D5.2, with the length of mains replaced by the renewed mains deducted at line D5.7. Lines D5.1 – D5.8 were reconciled.

This revision appears to give a more consistent statement of the length of mains abandoned. It should be noted that in Table D6 the lengths of critical and non-critical sewers replaced (lines D6.6 and 6.7) do not appear to be matched by similar lengths abandoned (lines D6.7 and 6.12). This means that practice is now inconsistent between mains and sewers. Scottish Water has stated that one of the reasons for differences in table D6 is the fact that combined sewers are replaced by separate systems.

Further information by line is given below.

Line 1: The opening balance of mains length comes from Table H4, Line 3 in AR 06. This is based on the length recorded in GIS after data adjustments.

Line 2: It is assumed that the length of mains renewed is the same as the length of the mains which are replaced.

Lines 2-3: No target lengths are set for replacement or relining lengths within projects. Reline or replacement lengths within projects are assessed during the Pre Project Appraisal of the Pre and Post Project Appraisal System (PPRA). Pipes assessed as being in grades 1&2 are relined where internal condition requires this. Pipes in grades 3, 4 & 5 are replaced.

In previous years we have reviewed PRA reports and seen that they follow common practice. It should be noted that the customer serviceability criteria method used under the Common Framework for the Business Plan is not used, although interruptions to supply is considered.

Lines 4 & 5: The length of mains cleaned is assessed from WAMS job codes. The total at Line 5 includes 65 km flushed for quality purposes (including routine flushing) and 22 km flushed after capital maintenance work, before being returned to service. While the latter is consistent with the WIC guidance we query whether routine flushing following capital works rehabilitation is what was wanted. A clarification of the guidelines would be useful.

Line 7: The basis for assessment of this line is GIS, updated from contractors' or operational survey sheets using a procedure set out in a Technical Guidance Note (TGN). CAPEX5 approval and the corresponding payments are withheld from contractors until this data has been provided.

Line 9-11: No communication pipes were replaced in the report year for quality purposes. 23% of communication pipes replaced were of lead. Of lead communication pipes replaced, 67% were in conjunction with the mains rehabilitation programme and 33% were as a result of reactive operational work, including requests from customers to remove lead communication pipes following the customer's removal of lead service pipes.

Line 12: This line reports the cumulative total of all DMAs which have been handed over. At the time of handover all of these DMAs were in Category 1. Any of these DMAs may now be temporarily in Categories 2 or 3 at any time.

Line 13: This line reports the number of DMAs fully validated and handed over during the year.

Line 14: This line is obtained by summing lines 12 and 13 and reconciles with the figure reported in AR06.

Lines 15 -16: PSP holds property data within DMA polygons uploaded from the GIS and these have been used to estimate the number of properties served by each DMA. Comparison with the total estimated number of Scottish households gives the quoted figure, with percentage properties standing as a surrogate for percentage population. For line 16, 'valid' is taken as meaning all DMAs which have been validated, even if some are currently at Category 2 or 3. This is considered to be acceptable.

Line 17: For this line 'valid' is also taken as meaning all DMAs which have been validated, even if some are currently at Category 2 or 3. The number of connections in each DMA polygon is calculated on a DMA-by-DMA basis for each valid DMA from the number of properties in that DMA (as in lines D5.15 and D5.16), applying a rule-based approach which allots numbers of connections to groups of stacked properties. This approach is based on surveys carried out by East of Scotland Water under the INMS programme and is covered by Technical Guidance Note WIC/TGN/H3_07. Since some properties have shared connections, the number at Line 17 would be expected to be lower than that at Line 16, where percentage properties are used as a surrogate for percentage population. Although Line 17 is bigger (73%) than Line 16 (71%) the difference is within the spread which could be expected within the accuracy levels of the allotted confidence grades.

Line 18: For this line 'valid' is also taken as meaning all DMAs which have been validated, even if some are currently at Category 2 or 3. The length of mains in each DMA polygon is obtained from GIS and the length in valid

DMAs is summed for comparison with the total length in Scottish Water (Line D5.8).

Comments by Confidence Grade

Lines 1 to 8: Confidence grades of A2 are allotted to lines D5.1, D5.7 and D5.8, where lengths are taken direct from GIS. Lengths of mains renewed, relined and laid new (D5.2, D5.3 and D5.6) are taken from contractors' returns and given a grade of B2. Line D5.7a includes data improvements and has a grade of B3. Lengths of mains cleaned (lines D5.4, D5.5) are taken from WAMS and have a grade of C4. These grades are accepted as reasonable.

Lines 9 to 12: Lengths include those replaced by reactive operational work recorded on WAMS. Grades are accepted as reasonable.

Lines 12 to 18: Confidence grades have been assessed in line with WIC guidance. The stated confidence grades are accepted, but the use of percentage property connections as a surrogate for percentage population results in some minor uncertainty regarding Lines 15 and 16. Average Scottish household occupancy rates are currently being reviewed. Averaging over large numbers of households will tend to reduce the potential discrepancy.

6.3 Table D6: Asset Performance and Activities – Wastewater Service

Commentary by REPORTER

6.3.1 Lines 1 to 13; critical /non-critical sewers

Introduction

Key Points

- The reported length of critical sewer reconciles with the asset inventory Table H4. Scottish Water has mainly used the same methodology as last year to estimate its critical sewers. The methodology was updated in the previous report year to include additional features for proximity mapping – such as tourist, retail, industrial and hospital sites and an assessment of traffic sensitive sites. The methodology is discussed in the report for Table H4.

- The opening balance for total length of sewer is the figure reported in table E7 line 8 in the previous report year.

- The opening balance for total length of critical sewer is the figure reported in E7 line 13 and in D6 line20 in the previous report year.

- The closing balance for the total length of sewer is the figure reported in E7 line 8.

- The closing balance of critical sewer length is the figure reported in E7 line 13.

- No drainage area studies have been completed this year. Those ongoing (29) include new studies and updates to old studies.

Methodology

Activities – Wastewater Service critical/non critical sewers

The report on critical sewers is in several parts:

- A critical sewer balance, - opening balance, closing balance, new critical sewers added during the year;

- A report on the length of sewer assessed either by CCTV or man entry;

- A report of critical sewers renovated, replaced or abandoned;

- Other changes.

The opening balance for the total length of critical sewer is the figure reported in E7 line 13 in the previous report year.

Information on new critical sewers and new non critical sewers added during the year has come in from several different sources:

- Information from Developer Services who have a record on a site by site basis, which contains information on sewer lengths and sizes constructed and adopted in the report year. At audit a sample of the data provided by Developer Services was shown to be contained in the length of new sewers reported.

- Information from capital projects which has come from project managers, in the form of completed proforma spreadsheets. Sewers included would be those that have a beneficial use date in the report year. At audit, samples of base data (spreadsheet format) received from SWS, and the base data for the project closedown project, were shown to be contained in the length of new sewers reported.

It was also assumed that any Q&SII schemes were carried out on critical sewers. For the capital schemes, project managers determined whether sewers were critical or non-critical, moderated by Scottish Water based on the 450mm diameter criteria.

The length of critical sewers inspected throughout the year has come from several sources. The sources were as follows:

- Planned work which is kept on the CCTV data base.

- Data received from CCTV contractors. A questionnaire was sent out in March and data was returned by 2 out of 3 contractors, in the form of examiner databases. The location of these sewers was not determined. Their criticality was assessed on diameter and material i.e. if greater than 600mm and or masonry then they were critical, otherwise non-critical.

- Data based on an assessment of WAMS. The resolution codes were first assessed for man-entry or sewer inspections general, then this list was assessed for CCTV information. The list obtained was then assessed against the address location and the nearest connected pipe to the address assumed to be the one surveyed. Its description critical or non critical was then taken from GIS.

We conclude that the results are uncertain and it is possible that there could be double counting. This has not been checked or confirmed by Scottish Water and has not been audited in detail by ourselves.

The length of sewer reported as renovated has been reported as zero this year. Scottish Water state that it would consider renovation to include patch lining but no patch linings were carried out in the report year.

The length of sewer replaced has again been reported using data from several sources:

- From operations reactive data, including both critical and non critical sewers. This data has been supplied by the management accountants. It comprises a list of "repair" projects which have been capitalised by the accountants. Data has been supplied in several formats and compiled by Scottish Water for completion of the table. Critical and non-critical sewers have been determined based on sewer size, (i.e. greater than 500mm was critical). There is some missing data (if the data is not determined it will not be reported, i.e. assumptions will not be made for missing lengths). At the audit samples were shown which appeared in the reported figure.

- From the CID programme. Here lengths were reported in a table which detailed the work types, such as open cut, pipe insertion, sliplined, other, abandoned, CPP lining, local dig down and patch lining. All reported lengths were considered to be replacements, and it was assumed that all the lengths were critical sewers, although Scottish Water has asked for this to be confirmed from the data providers. At the audit samples were shown that appeared in the reported figure.

- From Scottish Water Solutions. SWS provided a list of work carried out in a proforma which was issued to them and returned to Scottish Water for reporting purposes. Sewers described as "Refurb Infrastructure" were selected for this line. It was assumed that they were all critical sewers. At the audit samples were shown which appeared in the reported figure.

- From Project Closedown Programme. At the audit samples were shown which appeared in the reported figure.

Overall, we conclude that given that the information comes from a number of sources it is probably reasonable but clearly the determination of what is critical or non critical is variable. We recommend that Scottish Water clearly determines its definition of a critical sewer and sends out guidance to all parties as to how the returns are to be prepared.

Abandoned Sewers have been determined from a query in GIS for the report year. The determination of critical versus non critical sewer is based on their previous tagging in the previous report year. Base data was not provided for audit purposes.

The closing balance of critical sewers has been determined by adding lengths from a number of sources:

- The opening balance of critical sewers;

- Alterations due to a data improvement exercise on the GIS;

- Alterations to entries on the database arising from a manhole survey data input;

- Sewers built and included on the GIS in the past year.

- A value of 50km assumed to be in existence but not yet added to the GIS.

The closing balance for all sewers is based on the total length of sewer in GIS, plus a further 1000km of main sewer, assumed to exist but which are not yet in the asset inventory together with an allowance of almost 16,000 km representing lateral sewers which are assumed to exist but are not included in the asset inventory. This is the same methodology as for last year's Annual Return, with the exception that the additional 44km for developments has not been included this year. The methodology for this is discussed in the report for Table H4. These figures are consistent with those in Tables H4 and E7.

Comments by Line

Line 1: This is the figure reported last year in table E7 line 8 and is the sum of last years H4 table lines 1 to 3 (i.e. critical, non-critical and sewage and sludge pumping mains).

Line 2: This is the figure reported last year in Table E7 line 13, and H4 line 1 (i.e. length of critical sewers.)

Lines 3 and 9: This is the length of new sewers added in the year – split into critical and non critical, as discussed in the methodology above. This is a different method from that used last year, when the number of new critical sewers was based on a query from the GIS data with the "when commissioned date" listed as "this year".

22km of critical sewer were added this year compared to 49km last year.

Line 4: This is the list of sewers inspected, made up of data from three sources as discussed above.

Lines 5 and 10: Scottish Water is reporting no renovated sewer lengths.

Lines 6 and 11: Scottish Water is reporting a total replacement length of 8.53km for Critical and 4.22km for non critical sewers. The length of sewer replaced covers the work carried out from Operations reactive work, Capital Investment Delivery, SWS and a project closedown project. The data cannot be directly compared to the G Tables as their format has changed this year.

The sewer length between manholes is reported as rehabilitated, even if the rehabilitation is only a local repair.

Lines 7 and 12: This is the length of sewers in GIS described as "abandoned" with the abandoned date in the report year. The length is split between critical and non critical sewer as discussed in the methodology above.

Lines 7a and 12a: These figures are simply balancing figures to enable the figures in the D6 table to summate to the "known" opening and closing balances.

Line 8: The closing balance for the length of critical sewer is 10837km, which is based on GIS and additions as discussed above due to data improvement, new assets added to GIS, built assets added to GIS, manhole surveys and an assumed off inventory allowance for assets which have not yet been added to GIS.

Line 13: The closing balance of 49067km comes from the assessment of the sewer lengths in this years GIS dataset, with assumptions for additional main sewer and lateral sewer lengths which are assumed to exist – but are not detailed in the GIS.

Comments by Confidence Grade

We accept that the proposed confidence grades are likely to reflect the quality of the data.

6.3.2 Lines 14 to 19; studies

Introduction

Key points

- Scottish Water has 805 drainage areas. Of these 115 are reported as having completed drainage area studies. Scottish Water is currently working on 29 drainage area plans. Of these 22 are updates of existing plans and 22 are new.
- No plans have been completed this year.

Comments on methodology

The number of drainage area zones, reported as 805, has not changed in this report year. Scottish Water previously undertook a major reassessment of drainage area study zone boundaries. Boundaries were redrawn to create zones which are, or might be, connected hydraulically. The objective was to define, on a common rational basis, a set of stable zones which are unlikely to change as future development occurs. We believe that Scottish Water has created a sound framework for undertaking, managing and reporting drainage area studies. .

In AR06, Scottish Water identified all drainage area zones in Scotland in the "total drainage area studies identified for study" line. It reflected an expectation that all drainage area zones would have some work carried out in Q&SIII ranging from collection of additional data to full drainage area studies. In this return Scottish Water are listing only those which are currently ongoing in lines 15 and 16, as they have stated that a plan of work is still "emerging".

Scottish Water reports that it has completed 115 drainage area studies in the past. Completed studies can consist of those at options report stage, but can also include those where a scoping study found that no further work was required, those at needs stage where no further work is required and some where work has ceased due to resource constraints or work prioritisations.

Drainage area studies may be commissioned for only part of an overall defined drainage area. Within the 115 drainage area zones reported as complete, there are 16 with multiple studies (Therefore some completed drainage area studies do not cover the whole drainage area). Within the 115 areas with completed studies 22 are now being updated in the current programme. There are 7 new Drainage Area studies ongoing.

Drainage area studies are carried out using industry standard software and technology available at the time of the study. The scoping study stage considers the development of appropriate tools to allow the robust identification/ confirmation and quantification of needs, perceived or otherwise, and solutions within the study envelope, in a cost effective manner.

As a result the study may not be fit for purpose in the future when software and technology will have developed and additional study drivers have been identified for the drainage area. It may then be necessary to revisit studies previously reported as completed to carry out model upgrades. This is apparent in the current report where, as mentioned above, 22 studies previously reported as complete are also reported as on-going.

A drainage area study which was completed in the previous report year was reviewed during this audit. It was determined that the DAP consisted of a scoping study received in 2002, a model build and verification study which commenced in 2002, but which appeared not to be completed until 2006, and a needs study. No Options study had been carried out. It was determined from reviewing the reports that this may have been due to the poor quality of the work at the model build and verification stage. Many of the assets at risk or reported as needs did not have sufficient backup information, in terms of a well verified model from flow and survey data, to be certain that the catchment needs identified should lead to an options study, and then to planned work in the catchment.

Assuming the DAP process is successfully followed, and checking and auditing carried out in a timely manner, DAPs are a useful tool to enable identification and prioritisation of capital maintenance work. However we do not believe that the study reviewed was adequate for effective identification and planning of future work.

Scottish Water stated that the specification for carrying out drainage area studies was currently being modified.

Comments by Line

Activities - Studies

Line 14: The number of drainage area zones which is unchanged since last year - 805.

Line 15: The number of drainage areas identified for study is returned as the number of drainage area plans ongoing in the report year. Of these 22 are updates to previously completed studies and 7 are new studies. This is different to last year where all 805 zones were identified for study.

Line 16 The number of studies on-going is the same as line 15.

Line 17: Scottish Water has taken the definition of this line as studies completed in the reporting year. Overall, 115 drainage areas have studies but they are not necessarily either technically complete or cover the whole drainage area.

Line 18: Reported as zero in the current report year as for line 17.

Line 19: Reported as zero in the current report year as for line 17.

Comments by Confidence Grade

Lines 14 to 19: Scottish Water report a confidence grade of A1 for these lines which we believe is reasonable for the numbers reported.

6.4 Table D7: Wastewater Capital Maintenance Expenditure

Commentary by REPORTER

Introduction

Key Points

- This is a new table for AR07, with data reported in a new format, so direct comparison is not possible with previous years
- The same methodology has been used to compile Tables D7 and D8
- The table is compiled from project-specific data, where the operational area, proportion of cost allocated to capital maintenance, and function are all allocated to each project before summation for the table totals
- The allocation of costs to drivers has been made differently for Q&SII and Q&SIII. For Q&SII procedures for the allocation of projects to categories are consistent with those used in the past, while for Q&SIII project managers have allocated costs to drivers based on their knowledge of the project.
- Scottish Water has reported on the basis of 4 operational areas (as in the past) rather than the current 8, as agreed with WIC. Scottish Water expect to be able to report on 8 areas in AR 08
- The table shows expenditure made on all projects in the year 2006/7, rather than expenditure on projects commissioned in 2006/7
- The correct allocation of projects to categories has been confirmed by audit, with the exceptions noted below

Comments on Methodology

Data was downloaded from the Capital Investment Management System (CIMS) into two databases, one for Q&SII projects and one for Q&SIII projects, immediately after the freezing of financial data in early April 2007. Operational area, capital maintenance proportions, function and infrastructure/non-infrastructure proportions were then allocated to each project as described below before summation to give the table lines.

Allocation of projects to operational areas

Reporting is on the basis of 4 operational areas. The geographical location of each project is known from GIS and the large majority of projects also have a Council Reference, which is the main basis of the allocation. The matching of Council references to operational areas is straightforward for most Council areas. Where operational area and Council boundaries do

not coincide, the allocation has been made by comparing GIS locations with Council area maps.

Two categories of projects were denominated as being Scottish Water-wide, rather than being allocated to an operational area. These were firstly linear projects (such as sewers) crossing operational area boundaries and secondly projects lacking a Council reference. Many of the latter are site-specific and in future years' returns SW propose to complete the allocation of these to operational areas.

Costs for all projects designated as being SW-wide have been allocated equally, 25% to each of the four operational areas.

Allocation of project costs to capital maintenance

This was carried out on the basis of the project drivers allocated to projects by project managers. The percentage allocated to capital maintenance varies from 5% to 100%. For Q&SII projects the practice was to allocate costs equally to each project driver, so a project with four drivers would have 25% of cost allocated to each driver irrespective of the actual cost to meet each driver. The proportional allocation of costs to drivers has not been revisited during the development of Q&SII projects.

For Q&SIII projects costs have been allocated to drivers in proportion to the project manager's estimate of the cost of meeting that driver. The initial allocation is made at CAPEX1 stage, before detailed costs are known. SW procedures allow for the allocation of costs to drivers to be revisited at each CAPEX stage and this was found in practice to be the case during the audit.

Scottish Water reports that it is currently implementing new capital expenditure rules and will be testing historic allocations of expenditure to capital maintenance. Scottish Water has discussed this with WIC and may revise previously reported figures after completing its testing.

Allocation of projects to Water/Wastewater and Infrastructure/Non-infrastructure

CAPEX forms make it clear whether a project is for Water or Wastewater and this is uncontroversial. The allocation of projects to infrastructure or non-infrastructure follows the rules given in the Annual Return Reporting Requirements. In a small number of cases designation was unclear and owing to lack of time project names were used for guidance on the designation. SW proposes to revisit these cases and make more accurate designations in future years.

Management and General

The allocation of projects to this category follows the definitions in the Annual Return Reporting Requirements. All support services are included, together with any projects which cannot be allocated to other categories.

Comments by Line

These are not given as the same methodology results in the production of all lines.

Comments by Confidence Grade

A confidence grade of C3 has been assessed by SW for all of the lines in the table, reflecting the uncertainties listed above in allocating a generally small number of projects to categories. This grading is felt to be reasonable and measures are planned by SW to improve confidence in future returns.

6.5 Table D8: Water Capital Maintenance Expenditure

Commentary by REPORTER

Allocations have been made on the same basis as for wastewater, reported in Table D7. Reference should therefore be made to that table for the methodology applied to Table D8.

7. SECTION E: OPERATING COSTS AND EFFICIENCIES

7.1 Overview

7.1.1 General Overview

Scottish Water has made a complete return of operating costs and associated explanatory factors in the E Tables.

Key points:

- Scottish Water has developed a well structured set of departments in its accounting systems which will allow costs to be allocated directly to assets. Scottish Water estimates that more than 80% of costs were being coded directly to assets by the end of the report year. Scottish Water has advised us that their target is to code almost 100% of attributable operational costs directly to assets.

- Scottish Water has allocated operating costs in the report year using an activity based management (ABM) system. This builds on the direct capture of cost to assets in the general ledger. The methodology adopted provides a rigorous and logical system of allocation based on recorded costs and activity measures and the knowledge and experience of managers. We have described the methodology and our audit of it in more detail in Section 7.1.2 below.

- Scottish Water has commented on the movement in total cost by line. In some cases these movements reflect real changes in cost. Other movements in cost reflect changes to the allocations made by Scottish Water. This included improvements to detailed activity and driver allocations and revised interpretation or assumptions regarding the allocation of ABM outputs to individual cost lines or assets.

- Scottish Water has improved its assessment of key explanatory factors such as pumping head. We remain concerned that the combination of distribution input and average distribution pumping head does not appear to reconcile with the reported cost of pumping.

- The asset base reported in the E Tables differs from the asset base reported in the H Tables. The E Tables cover operational assets while the H Tables also include decommissioned and redundant assets. Wastewater treatment works are banded by load in the E Tables and by nominal design capacity in the H Tables.

- There is broad consistency between data reported in the E Tables and the equivalent base information and performance figures reported in the data in the A and D tables.

- PPP assets and costs are included in the specific PPP Tables E3 and E3a only. This includes Scottish Water's costs in managing the PPP contracts. It also includes an allocation of Scottish Water costs of sludge transport and terminal pumping to align costs with assets or activities which form the explanatory factors. Scottish Water's costs include the cost of preliminary work in extending one PPP concession. If an

alternative direct capital procurement route had been used, these costs would have been accounted for as capital investment.

- The introduction of Scottish Water Business Stream and the reduction in work carried out by Scottish Water Contracting for Scottish Water Solutions results in a material reduction in the operational costs of the core business in the report year.

7.1.2 Activity Based Management System

Scottish Water has developed an activity based management system (ABM) based on Metify software to better understand its business. One output of the activity based costing system is the allocation of costs within the E Tables.

The basic steps in the process are:

- Cost data from the General Ledger was processed to generate ABM input accounts and departments.
- For each ABM Department the General Ledger costs (excluding recharges) are allocated to a consistent set of ABM activities used for all Departments. The allocation is based on specific knowledge of costs or activity or the advice of relevant department managers.
- A set of allocation rules were developed to reallocate relevant activities across departments and direct activities based on activity drivers such as the utilisation of IT systems or the number of customer contacts relating to that department.
- The input data was processed through repeat allocations on the ABM software to provide a matrix of reallocated costs by ABM department and activity.
- The structure of the reallocated costs allows them to be allocated to WICS categories allowing the E Tables to be populated.

During the audit we noted the allocation of general ledger costs to ABM input departments and accounts. All costs on the profit & loss accounts are processed including interest, depreciation and the infrastructure renewals charge. These categories of cost were stripped out of the final analysis for the E tables.

The reconciliation between the total sums reported in Tables E1 and E2 and Scottish Water's accounts reported in the Annual Report & Accounts 2006/07 is as follows:

From the Annual Return

Total operating cost (water service) – Line E1.31	*275.613*	*£m*
Total operating cost (wastewater service) Line E2.30	*231.325*	*£m*
Total operating cost	*506.938*	*£m*

From Scottish Water's Annual Report & Accounts 2006/07

Cost of sales (ex Income and expenditure account)	*549.7*	*£m*
Administrative expenses (ex Income and expenditure account)	*97.9*	*£m*
Exceptional items (ex Income and expenditure account)	*0.0*	*£m*
Deduct PFI fees and costs included in the above. *(Note 3 to the financial statement)*	*-125.6*	*£m*
Deduct additional costs included in PFI due to sludge, terminal pumping station and general & support costs	*-2.2*	*£m*
Deduct FRS 17 charge not included in the regulatory return (page 55 of the annual accounts)	*-5.6*	*£m*
Deduct running costs of Scottish Water Business Stream	*-7.3*	
Total operating cost	*506.9*	*£m*

Based on the reconciliation above, the total operating costs reported in Table E1 and E2 excludes:

- PPP costs, including fees paid and SW internal costs, which are reported in Table 3a.
- Net interest payable.
- Taxation
- Gain on sale of assets.
- FRS 17 adjustments
- Running costs of incurred by Scottish Water Business Stream since set up.

The ABM accounts combine one or more General Ledger accounts and match the WICS cost categories in the E Tables. Information on the ABM source account is maintained throughout the reallocations. Therefore the allocation of cost by category in the E tables maintains the allocation of cost to accounts in the General Ledger.

Each ABM department covers one or more of the accounting departments in the general ledger. The ABM input departments are developed to match the main functions of the company, either the operation of particular asset groups or the general functions which support Scottish Water's business. The asset based ABM departments broadly reflect the

WIC asset categories in the E tables with separate sets of ABM departments covering the four operational areas in Scottish Water.

Scottish Water developed a standard set of ABM activities which reflect the main activities carried out across its business. Appropriate managers and staff allocated department staff time and other costs to ABM activities. Much of this allocation work now takes place centrally from detailed accounting and timesheet records. Individual department managers are asked to check the allocations and adjust them for staff time not captured by timesheet and to correct any apparent errors.

Separate allocations of department costs were undertaken for staff time and other costs. Where appropriate (for example vehicle use) other costs were allocated in proportion to staff time.

In the report year Scottish Water continued to manage ABM on the basis of the four operational areas reported in previous years. Over the year Scottish Water re-organised into eight operational areas. These will form the basis of reports for future years.

The quality of the data generated by the ABM system is dependent on the allocation of department costs to activities which creates the ABM input data. During the audit we reviewed the allocations made for three ABM departments with the staff who prepared the allocations as follows: one area water production department, one area networks department covering water and sewerage and Scottish Water Contracting. We also reviewed the basis of the driver used to allocate fleet costs.

From these audits we found that:

- ABM Departments related to operational assets are a combination of accounting departments on the General Ledger. ABM departments reflect, in part, the operational areas and the service categories which are required to complete Tables E1 and E2. This alignment between the ABM departments and the operational areas and service categories is a key component of the allocation of costs in Tables E1 and E2.

- The ABM Accounts, which summarises account information from the general ledger, reflect in part individual lines in Table E1 and E2. The source account information is maintained in the allocations carried out in ABM. The source account is used as a key component of the allocation of costs between lines in Tables E1 and E2.

- Scottish Water has developed a department structure in its accounts which has a strong link to assets. Asset departments in the accounts are typically an individual water source, an individual treatment works, a Drainage Operating Area or a Water Operating Area. This allows costs to be allocated directly to individual assets.

- A key component of the ABM system is the allocation of ABM department costs by "Activity". A standard activity list has been prepared to match reporting requirements and internal business requirements.

- General Ledger cost information is now the primary source of asset based cost information. Metify ABM is used to supplement this direct cost capture and to allocate support activity costs which cannot be charged directly to assets.

- During our audit we noted that non-pay direct costs including power, hired and contracted services, materials and consumables and SEPA charges are allocated directly to asset departments in the accounts. While these costs are rolled up into ABM departments to allocate costs for Tables E1 and E2, the detailed cost allocations in the accounts form the basis for the allocation of this type of costs to specific assets in the subsequent E Tables.

- Pay costs are typically allocated to accounts for individual teams responsible for a group of assets. The costs are then recharged in the accounts to individual assets. The recharges are based on internal recharge rates which are built up to take account of all employment costs including an allowance for vehicles. The recharge rates also include an allowance for management and support staff whose time is not recharged direct to assets.

- The ABM process used ledger data before recharges. Ledger data after recharge forms part of the information used to allocated costs to assets.

- In the report year Scottish Water introduced electronic time-sheeting of its operational staff which allowed a high level of detailed cost capture to individual assets. This replaced the system of task schedules used in previous years which reported expected work load rather than actual work load.

- As a result of the introduction of operational staff time-sheets, the company has been able to increase centralisation of the production of the activity schedules which form part of the input data for ABM. Draft schedules were produced showing recorded costs or staff time. Operational managers are asked to distribute unrecorded costs and make any other amendments necessary based on their experience. As the timesheet system becomes fully used, direct cost capture to assets will be almost complete. The main function of ABM will then be to distributes central costs and allow the company to generate whole cost data for individual assets or activities.

- The allocation of time not captured by timesheets is one of the key areas of judgement underpinning the allocation of costs to the E Tables. During our audit we noted that staff preparing the allocations had direct experience of the work they were being asked to allocate and had made every effort to relate actual activity to ABM activities.

- Work on the allocations was well support centrally by with finance department staff working in the operational areas providing a common link.

- Some asset cost centres will capture costs for more than one function recorded in the E Table. In particular a sewage treatment works cost centre may capture costs of the associated sludge treatment works. A water treatment works will include pumping into distribution. In these circumstances managers are asked to spilt relevant costs between the two process areas which are then captured in the ABM activity allocations.

- The cost allocation for sludge treatment is to sludge treatment centres. Haulage cost are recorded for the works the sludge comes from. At present the ABM process cannot allocate costs of transport or treatment between sludge outlets. As a result a further allocation is made outside ABM which is based on modelled sludge disposal costs.

- The activity drivers used to allocate central costs were based on appropriate data sets for which clear audit trails exist. Scottish Water has undertaken additional development of its systems to automate capture of the relevant data for cost drivers.

The activity costs entered in ABM are totalled and the ABM system reallocates cost of activities which do not relate directly to the primary activities which deliver services to customers. The "activity drivers" used to make these allocations are based on measures of activity for individual ABM departments such as the number of work stations supported or the number of customer contacts in a particular operational and service area. Once the reallocation to ABM departments has been made the cost reallocated to a department is allocated to activities within that department, either based on the same driver, if that driver is activity specific (e.g. water rising contacts), or based on the activities undertaken by that department. This might result in cost being allocated back to support activities and the process of reallocation is repeated until the residual cost allocated to support activities has reduced to trivial amounts.

The ABM process reassess some of the detailed cost allocations made within the financial accounting process. To maintain consistency with the accounts, the ABM output is adjusted to match the financial accounts as follows:

	General Ledger	ABM Output
Recharge to capital	67.5 £m	67.0 £m
PFI	125.6 £m	127.4 £m
Non-regulated activities	28.3 £m	28.3 £m
Scottish Water Business Stream	1.7 £m	2.3 £m
Provision of services to Scottish Water Solutions	3.6 £m	6.6 £m

The residual is distributed across other ABM departments by E table services and account lines following analysis of ABM output. This analysis means that the account line is maintained from the original source cost. Where no service information is recorded within ABM output the cost is allocated in proportion to recorded ABM output.

For PFI no adjustment is made as the difference reflects inter-site sludge tankering, terminal pumping and additional support costs which are not captured in the financial accounts.

7.1.3 Allocation of costs to assets

The ABM output allows all costs to be allocated to groups of assets consistent with the asset and operational area structure required to complete the E Tables. A further stage is required to allocate costs to the individual cells in the E Tables. For water mains and sewerage costs this can be achieved by summing the costs for the relevant ABM departments. For water and wastewater treatment, it is necessary to allocate costs to individual treatment works to ensure that costs for large treatment works can be identified and small treatment works can be banded by capacity or load.

The allocation of cost to individual water and wastewater treatment works is carried out outside the ABM system and is based on the costs allocated to each asset on the general ledger (including recharge).

All water treatment works, sludge treatment centres and wastewater treatment works excluding septic tanks are identified as a separate department on the general ledger which capture costs either directly or by recharge. For septic tanks, a general ledger department will cover a number of assets and the costs recorded on the general ledger are distributed across individual septic tanks in proportion to design capacity or load.

For each group of assets the difference in the cost allocated by ABM and the costs allocated in the ledger including recharge are identified and a residual calculated for various types of expenditure. These residual direct costs were distributed back across the individual assets in proportion to the cost of expenditure type within the operational area. Given the high rate of cost capture, the adjustments required are small.

In the report year the company has allocated general and support expenditure across assets in proportion to direct labour cost capture. In previous years the costs were distributed on the basis of flows and loads. Scottish Water has adopted this policy on the assumption that most general and support expenditure supports staff rather than other work. Since staff costs are now captured through time-sheets, the company considered this allocation to be more robust. A key impact of this change has been a movement of costs from large wastewater treatment works to small treatment works. The company estimates this to be of the order of £2.6 million.

In some instances the ABM process reallocates costs to activities which Scottish Water wishes to report on a consistent basis with their audit accounts (see above)..

7.1.4 General remarks on the allocation of costs

We have followed an audit trail through each step of the process and found it to be a rational and logical method of allocating costs which cannot be booked directly to assets on the general ledger.

We found that the department structure in the accounts provides a good basis for the allocation of cost direct to assets.

We have noted action taken by Scottish Water to improve the quality of the allocations by developing the activity and driver allocations. We have found that Scottish Water makes good use of the available data to provide a robust and rational allocation.

We have noted particular areas of concern regarding the allocation of sludge treatment costs and power costs which may affect the allocation of costs and the relationship between costs and explanatory factors in the E Tables. Scottish Water has noted these areas and developed its process to improve its allocations.

We have audited the process with a view to the allocations required in the E Tables. The ABM process may be used to provide other regulatory information from time to time. For these returns it would be necessary to consider the activity allocations and drivers which are material to those returns to ensure that they are fit for purpose.

7.1.5 Infrastructure depreciation charge

This year Scottish Water has set an infrastructure depreciation charge of £88 million; £54.5 million for the water service and £33.5 million for the wastewater service. Within the water service £4.5 million has been allocated to water resources and treatment and £49.9 million has been allocated to water distribution. This is a reduction from last year's figure of £110 million.

This year's figure is a view taken by Scottish Water as set against the following background information:

The last 5 years:

1. As reported in tables G1 and G2, actual Infrastructure Maintenance Expenditure (IME) over the last 5 years gives an average IME of £110M (approximately £117M in 2006/7 prices)

Q&SIIIa period (final determination):

2. The final determination figure results in an IDC of £88M over the period 2006/7 to 2009/10 (2005/6 prices).

3. In the final determination WIC assumed that this year's IDC would be £88M, then rising with inflation.

Scottish Water has therefore set its IDC at the level assumed by WIC.

Scottish Water reported last year that its consultants had reviewed the level of IDC that should be sustainable and concluded that a figure of around £92M would be acceptable, largely based on comparative methods rather than engineering analysis. We understood from our reading of the consultants' report that this figure was around 6% more than the average used in England and Wales for the period 2004/5 to 2009/10 when expressed as a £/km of pipe.

Previously we compared water main burst rates in Scotland with those in England and Wales and concluded that they were roughly comparable. We also compared sewerage data. The

comparison was confused by the inclusion of laterals in the sewerage asset stock in Scotland but not in England & Wales. However, we concluded that the sewerage IDC for Scotland appears to be consistent with companies in England & Wales.

The pattern of water mains bursts and sewer collapses as reported by Scottish Water since 2003/4 is shown in the table below:

Indicator	2003/4	2004/5	2005/6	2006/7
Water main bursts	**8466**	**10102**	**8713**	**7822**
Sewer collapses	**2399**	**3740**	**2468**	**2754**

This does not show any particular trend of deterioration based on the average spend of £117 million pa in today's prices.

In tables G1 and G2 Scottish Water is forecasting its future IME. This indicates an average spend of £121 million over the next 4 years, at variance with the proposed £88 million of IDC.

Given these conflicting facts we cannot say if the IDC for this year is high enough to give reasonable assurance that infrastructure assets will not deteriorate. We recommend that serviceability indicators are carefully monitored. However, given that IME levels are expected to be marginally more than those in the last 5 years we would not expect any significant deterioration in serviceability up to 2009/10.

We note that IME has generally been above IDC in every year but this is now set to change. Scottish Water informs us that this has no particular impact on the accounts, other than a change in the net book value of the infrastructure. Nevertheless, given that the IDC is meant to reflect the average charge needed to maintain the assets over the medium term we fail to understand why it has been varying so markedly.

Scottish Water reports that the IDC is appropriate and has been accepted by its Audit Committee including its financial auditors.

7.2 Table E1 and E2: Activity Based Costing

Commentary by REPORTER

Introduction

Scottish Water has provided an allocation of operating costs to water and wastewater services in Tables E1 and E2 respectively.

In the comments by line we note the key drivers used to allocate OPEX to individual cost categories and our view of the robustness of those allocations.

Because of the link between Table E1 and E2 we have opted to combine the comments by line in this section to reduce duplication.

Key points:

- The allocation is based on operating costs recorded in Scottish Water's general ledger which have been allocated through Scottish Water's Activity Based Management system (ABM). We have commented on the ABM methodology in Section 7.1.2.

- Overall operating expenditure has reduced from £302.0 million in 2005/06 to 282.8 million in 2006/07, a reduction of £19.2 million (2005/06 OPEX restated to exclude exceptional items and incorrect transfer of costs to PFI). However, this overall reduction includes a number of policy changes and atypical costs as follows:

Reduction in non-regulated expenditure mainly due to switch in Scottish Water Contracting workload from a service to SWS to direct capital investment by Scottish Water	-22.3	£m
Transfer of retail business activities to Scottish Water Business Stream (including bad debt) for part of the year	-5.6	£m
Atypical fees to WIC for CMA set up	1.5	£m
Atypical reduction in domestic bad debt	-6.0	£m
Total	-32.4	£m

- Other cost savings have been exceeded by cost increases including inflation, the cost of operating additional assets and power cost increases.

- Scottish Water has commented on the movement in total cost by line. In some cases these movements reflect real changes in cost. Other movements in cost reflect changes to the allocations made by Scottish Water including: improvements to detailed activity and driver allocations; and, revised interpretation or assumptions regarding the allocation of ABM outputs to individual cost lines or assets

Comments by Line

Employment costs:

Direct employment costs are identified from the allocation of employment costs to activities. Employment costs have increased in the report year. Further reductions in head count were off-set by pay increases.

Power costs:

Power costs are generally allocated directly to assets based on meter readings and these direct allocations are maintained through the ABM system. There are a number of exceptions where power consumption recorded on a single meter must be allocated to different service areas. This includes the allocation of power cost for sludge treatment and the allocation of costs for water treatment works between resource and treatment and distribution

There is a general increase in power costs in line with rising electricity prices. The company notes the impact of the end of a fixed price contract with Scottish Power. For the water service there has been some movement of power costs from resource and treatment to distribution based on on-going reviews of the allocation of power costs of distribution pumping at major water treatment plant. The company has also attributed part of the increase to additional pumping in dry-weather.

Hired and contracted services

: Hired and contracted services are generally allocated directly to assets or sub-areas of the operational areas in the accounts. There has been an increase in hired and contracted services.

Materials and consumables

Material and consumables are generally allocated directly to operational assets or sub-area of the operational areas in the accounts. There is an increase in materials and consumables attributed to rising chemical prices and operational costs for new works.

Bulk supply costs

Scottish Water does not receive bulk supplies.

Service charges by SEPA

SEPA costs are allocated directly to assets in the accounts and this allocation is maintained through the ABM system. There is a £2 million increase in SEPA costs mainly attributed to the introduction of CAR licence charges for water abstraction.

Other direct costs

The increase in other direct costs is mainly due to an increase in insurance costs.

Total direct costs:

Calculated line summing the direct costs.

General and support costs

General and support costs are identified by the activity allocation in ABM with the main costs allocated from general and support accounts in the ledger.

There has been an overall reduction in general and support service costs.

In the report year savings have been off-set by restructuring costs of £2.3 million including voluntary redundancy costs. In previous years, restructuring costs were generally included as exceptional items.

Functional expenditure

Calculated line summing the direct costs and associated general and support expenditure.

Customer services covers billing activities.

The allocation of customer service and billing activities between water and sewerage service is driven by various activity drivers, e.g. the volume and the type of bills issued and other billing activities.

Customer service costs have decreased due to the transfer of non-household billing to Scottish Water Business Stream.

Scientific services

Scientific services is allocated between the water and wastewater services using drivers, applied to relevant activities, which include the number of sample visits and sample analysis undertaken in the year.

Other business activities

Other business activities include interaction with regulatory bodies including reporting and liaison. Much of the increased of £1.8 million relates to an atypical fee to WICS as a contribution to the establishment costs of the Central Market Authority.

Total business activities

Calculated from the three lines above.

Local authority rates

Local authority rates are charged against specific assets for the sewerage service and as a single sum for the water service. Rates are also charged on buildings which serve general business activities.

It is possible to allocate rates to specific assets for the wastewater service.

Rates for buildings serving a general business purpose are allocated between the water and wastewater services on the basis of internal property recharges and occupancy rates by department.

In the report year, no business rates were reported against business activities. Any allocation to these categories in ABM were identified by the source account and reallocated to local authority rates in tables E1 and E2.

ABM allocates an element of rates bills to third party services. This allocation is maintained for tables E1 and E2 and an element of the total rates bill included in third party services.

Doubtful debts

There has been a reduction of £11.6 million in doubtful debt. This is explained by the transfer of non-household bad debt to SWBS during the year (£1.9 million), a release of bad debt provisions of £6.0 million, and £3.7 million reduction due to improved collection.

Doubtful debts are allocated between the water and sewerage service using a driver which identifies aged debt against water and sewerage accounts weighted on 100% of debt >1year and 40% of debt > 4 months.

Bad debt relating to third party services is reported under third party service – opex.

Exceptional items

No exceptional items are reported this year. In previous years restructuring costs including voluntary redundancy costs were reported as exceptional items under the Q&SII spend to save programme. In the report year on-going restructuring costs including voluntary redundancy costs are included in General and Support costs.

Total opex less third party services

Total opex less third party services is calculated from the data above.

Third party services – opex

The major change in third party services opex in the report year is mainly due to a reduction in services to Scottish Water Solutions by Scottish Water Contracting. Work on capital schemes previously undertaken for

SWS is now carried out for Scottish Water direct and charged to the capital account.

There has been an increase in business development activities providing support services to developers. There has been improved capture of other third party activities, in particular costs of water connections.

Planned and reactive maintenance (included in opex)

Planned and reactive maintenance costs included in opex have not moved materially in the report year. Within the water service general savings have been off-set by increasing activity on water mains leakage.

Infrastructure Depreciation Charge

There has been a reduction in infrastructure maintenance charge from £110 million in 2005/06 to £88 million in 2006/07. We have commented on the movement in Section 7.1.5. The company has reduced the charge to align with the final determination for Q&S3a. We understand that projected expenditure in 2006/10 is higher than the charge made.

Non-infrastructure depreciation charge

Depreciation is directly charged to assets, and therefore services, based on the fixed asset register. Depreciation on support activity relates assets are allocated based on the relevant ABM support activity drivers e.g. IT application user numbers. The company has noted that the reduction in non-infrastructure depreciation charge in the report year reflects the impact of investment in long life assets and the impact of short life assets such as IT having been fully depreciated in previous years.

Comments by Confidence Grade

The company reports confidence grades of A2 for most cost allocations and A3 for reported planned and reactive maintenance costs. We believe that this is reasonable.

7.3 Table E3 – PPP Project Analysis

Commentary by REPORTER

Introduction

Key points

- The 9 PPP concessions reported in Table E3 cover twenty wastewater treatment works and one sludge treatment plant.
- The treatment works treat almost half the total load discharged to sewer in Scotland. An estimated 82% of the wastewater sludge produced in Scotland is treated and disposed of through the PPP concessions.
- The return has been prepared by Scottish Water's PFI Team with detailed technical and financial knowledge of the PPP schemes.
- In the report year Scottish Water undertook a review of the reported assets to ensure consistency of reporting and to provide a robust audit trail.
- Two works, Dalmuir and Whitburn, are failing works. Dalmuir was also a failing works in the previous report year.

Methodology

Project Data

Twenty-one PPP assets have been identified covering twenty wastewater treatment works and one sludge treatment centre (Daldowie).

The loads for individual treatment works were calculated in the same way as other treatment works loads using the methodology and data sources described in our report on Table A2. The population equivalent in line 3 equals the load reported in table A2 line 60 using a conversion factor of 60 g.BOD/d.

Scope of Works

The information on the scope of works can be reconciled with records of the scope of the PPP projects.

Sewage Treatment – Effluent Consent Standard

In the report year some consents have been transferred to CAR licences and this process will continue. We have used the term consent throughout our commentary.

In the report year Scottish Water has adopted a consistent policy of reporting consent parameters excluding the UWWTD consent parameters. As a result there have been significant changes in the year and some coastal discharges which only have UWWTD consent limits show no reported consent conditions.

We recommend that WICS provides additional clarification on the consent limits to be reported in this section taking account of the following:

- That consents will have different sections covering the limits necessary to meet national river quality objectives and further limits for the same parameter to meet European obligations such as the UWWTD.
- That consents will have look-up table limits and upper tier limits for the same parameter.
- That the UWWTD section of the consent provides limits defined by either a concentration or a percentage removal and meeting either limit meets the requirement of the consent.

We note that in similar reports in England & Wales the WaSCs are asked to indicate where a consent limit for BOD drives solids performance or where a consent limit for ammonia drives BOD or solids performance.

In the case of Newbridge, the ammonia consent has been reduced by SEPA to take account of overall receiving water quality following the transfer of an existing industrial discharge to the treatment works. Other corrections have been made following a review of consents.

Compliance with the effluent consent standard has been calculated as the number of sanitary determinants passing divided by the number of sanitary determinants tested. Scottish Water has based its report on the following determinants:

- BOD
- Ammoniacal nitrogen
- Suspended solids
- COD
- Phosphorous

The percentage compliance has been calculated for compliance against the COPA consent or replacement CAR licence and excludes performance against the UWWTD section of the consent. Compliance is judged over a nine month period only from the April 2006, when the new CAR licences were introduced, and the end of the calendar year.

Two PPP works were failing works in the report year: Whitburn and Dalmuir. Dalmuir was a also failing works in the previous year.

Sewage Treatment Flows

Sewage treatment flow data included in previous returns was not requested for this return.

Sewerage Data

Scottish Water has abstracted sewerage data from records of the PPP scheme supported by information in the concession agreements.

In the report year the company undertook a detailed review of its PPP assets and collated the necessary data to provide a robust, consistent and clear audit trail for this data. In our previous reports we identified some concerns in respect of this data and believe that these have been resolved. Scottish Water has:

- Included the length of outfalls from overflows and treatment works.
- Counted separate storm and foul pumping stations within the same structure as two pumping stations in their respective section of the table.
- Included terminal pumping stations located on treatment works but excluded interstage pumping stations on treatment works.
- Accounted for standby capacity at pumping stations in accordance with the requirements and in a consistent way.

All sewerage is reported as critical sewers. We understand that Scottish Water has not undertaken a detailed analysis to confirm that this is the case. However, by inspection, we believe that most, if not all, the sewerage included in the return would be classed as critical under one or more of the criteria of the Sewerage Rehabilitation Manual.

Sludge Treatment and Disposal

In line with Table A2, the reported quantity of sludge is an estimate of the quantity of raw sludge produced. For the PPP schemes this has been developed from records of the quantity of sludge disposed of from the works with a factor applied to reflect the quantity of sludge mass converted to water or gas during treatment.

The sludge quantities disposed of from each works are provided by the PPP concessionaire. These are not checked by Scottish Water with the exception of sludge output from Daldowie where payments are made on the basis of sludge quantity.

We have had sight of the enforcement notice issued by SEPA for disposal of sludge through Longannet Power Station which permits the continued disposal of sludge subject to action to be taken by Scottish Power Generation Limited.

Comments by Line

Lines 0: The PPP projects plants and groupings are those reported in previous years.

Line 1: The resident population has been taken from the assessment and distribution of connected population described under Table A2 and is consistent with the load reported in A2.60.

Line 2: The non-resident population has been taken from the assessment and distribution of holiday populations described under Table A2 and is consistent with the load reported in A2.60. The reported population is the average monthly population.

Line 3: The population equivalent stated is for the total load including household, non-household, non-resident, trade effluent and tanker loads discharged to the effluent stream. It equals the load reported in table A2 line 60.

Lines 4 to 8: There have been minor changes to the scope of works arising out of a detailed review of assets. In particular, changes have been made to sewerage and terminal pumping station data. From the information provided we believe that the scope of works identified is a reasonable representation of the PPP Projects.

Lines 9 to 14: We have described Scottish Water's approach to reporting consent data in the section above on methodology. We note that the report excludes UWWTD consent parameters. There have been minor corrections to the reported data following a detailed review of consent information.

Line 15: The reported data is the number of sample failure against the look-up table consent limits in the COPA section of the consent. This is consistent with the approach adopted for Table E8 and E9. The compliance report is based on 9 months data only from April 2006, when the new CAR licences were introduced and the end of the calendar year.

Lines 15 to 21: Scottish Water has reported treatment works categories in Lines 15 to 21. One correction has been made to Levenmouth which does not have primary treatment (settlement) prior to the aeration stage.

Line 22 to 32: The sewerage data has been taken from information in concession agreements supported by information provided directly by the PPP contractors. In the report year Scottish Water undertook a review to provide a consistent report and a robust audit trail for the data. We have commented on this in the methodology section above.

The company has followed the reporting requirements to include terminal pumping stations in the peak pumping capacity but not the installed power. We suggest that the line definitions are reviewed and confirmed by WICS.

Lines 33 to 40: The quantity of sludge has been taken from records of the PFI contractor regarding the quantity of sludge disposed of. The quantity of sludge disposed of has been increased to reflect the loss of sludge during treatment.

The sludge quantity has reduced by 10% in the report year. We have commented on the variation of sludge production in our report on table A2.

Comments by Confidence Grade

We consider the confidence grades allocated by Scottish Water to be reasonable.

7.4 Table E3a PPP Cost Analysis

Commentary by REPORTER

Introduction

Key points

- The PPP cost analysis covers the twenty wastewater treatment works and one sludge treatment plant covered in the Project Analysis in Table E3.
- The PPP operating costs are taken from the financial model for each scheme prepared when the concession agreement was closed. The reported costs are not actual costs incurred by the PPP concessionaires.
- The public sector capital equivalent values are reported to be taken from a report to the Transport and Environment Committee on 21 June 2001 adjusted by inflation. The reported costs are not the actual costs of constructing the plant. The reported costs take no account of any subsequent investment by PPP concessionaires.
- The reported costs include the cost of associated terminal pumping stations operated by Scottish Water and haulage costs of sludge generated at Scottish Water treatment works but transported to PPP plant for treatment. These adjustment are made to align costs with the relevant explanatory factors.
- Scottish Water provides a detailed explanation of movements in costs including an explanation of atypical costs.

Methodology

The cost analysis is presented in three blocks covering sewerage, sewage treatment and sludge treatment with a summary presented as a total cost analysis.

Estimated direct operating costs

Estimated direct operating costs have been calculated from the financial models prepared when the concession agreement was closed. The reported costs are not the actual costs incurred by the concessionaire. During our audit Scottish Water was able to demonstrate the calculation of data reported in Table E3a from the copies of financial models within Scottish Water's records.

The financial model costs were based on a range of assumptions including:

- assumptions regarding changes in flows, loads and sludge imports; and,
- assumptions regarding cost inflation.

The reported costs, based on the financial model, do not necessarily relate to the reported revenue or the flows, loads and sludge imports measured in the report year.

Where a financial model does not make a direct split between sewerage, wastewater and sludge costs, factors have been applied based on the financial models for other PPP concessions which included a split of cost between the relevant categories.

The direct cost estimates from the financial models appear to include functional and support expenditure and appear to be equivalent to the total operating expenditure as defined in Table E1and 2 line 26 with adjustments for rates and SEPA charges when these are paid directly by Scottish Water.

Rates paid by the PPP contractor

Depending on the concession agreement the rates may be paid by the concessionaire or by Scottish Water direct. Rates paid directly by the PPP concessionaire are estimated by Scottish Water for the purpose of Table E3a using the published rateable value of the property. Rates paid directly by Scottish Water are taken from the General Ledger.

Scottish Water has reported all rates paid (whether by the concessionaire or by Scottish Water) under "rates paid by the PPP contractor". Rates paid directly by Scottish Water are not double counted in Scottish Water costs.

Scottish Water general and support expenditure

Scottish Water general and support expenditure covers all other costs incurred by Scottish Water. It excludes rates paid by Scottish Water which are included in under "rates paid by the PPP contractor"

Costs are allocated to individual works where there is a direct link. Other general and support costs are distributed across the works.

Scottish Water general and support expenditure includes £1.7 million for tankering sludge from Scottish Water treatment works to PPP plant for treatment and disposal. This allows the allocation of cost to match the reported sludge quantities for the purpose of econometric analysis.

Scottish Water undertakes the disposal of sludge from the PPP plant at Inverness. The quantity of sludge is reported in table E3 but the cost of this disposal activity is included in table E10.

Scottish Water has identified the cost of terminal pumping stations operated by Scottish Water which pump to PPP works. Again, to maintain consistency with the allocation of costs for econometric analysis, the cost of £0.4 k incurred by Scottish Water has been included in Table E3. This adjustment is made for the first time in the report year.

Scottish Water general and support expenditure includes payments made by Scottish Water in the development of PPP assets. In the report year Scottish Water has made direct payments for the development of assets at Stonehaven. We understand that the future development of this plant will be made by the concessionaire and payment made through a renegotiated fee. The payments made by Scottish Water are treated as OPEX. If an alternative direct

procurement route was used, this investment might have been treated as CAPEX. We believe that these costs are atypical and would not be expected to occur in future years.

SEPA Charges

SEPA charges paid by the PPP contractor were estimated by Scottish Water from information provided by the PPP contractors in 2003-04 inflated in line with increases in SEPA charges to Scottish Water.

SEPA charges paid by Scottish Water are taken from the General Ledger.

Total direct costs.

The total direct costs in line E3a.23 is calculated within the table as the sum of the direct costs identified above. The direct costs are estimated from the financial models prepared at the start of the concessions and are not a statement of current operating costs.

Total Scottish Water cost

Total Scottish Water costs in line E3a24 are calculated within the table. They exclude the business rates paid directly by Scottish Water for PPP plant which are included in the total direct costs in line E3a.23.

They include the following:

Description	**£m**
PFI Team costs	0.503
SEPA charges paid direct	0.792
Other costs incurred by Scottish Water including cost of Stonehaven development, and professional services.	3.040
Sludge tankering from Scottish Water works to PPP works	1.661
Terminal PS operated by Scottish Water pumping to PPP treatment works	0.408
Other general and support costs associated with the above allocated through the ABM process	0.133
Total (reconciles to E3a line 24)	6.537

Total operating cost

The total operating cost is the sum of lines 23 and 24 calculated within the table.

Annual charge

The annual charge is the balance of expenditure incurred by Scottish Water on PPP works which is not included in the "total Scottish Water cost" described above. It includes the following:

Description	**£m**
Fees paid for services under the PPP concession contracts	114.933
Business rates paid direct by Scottish Water not captured in the "total Scottish Water costs" above	2.831
Additional provision against potential additional costs	3.500
Total (reconciles to Table E3a.26)	121.264

The combined total Scottish Water cost (Line A3a.24) and Annual charge (A3a.26) totals £127.801 million which reconciles Note.3 to the financial statement included in Scottish Water's published Annual Report & Accounts 2006/07.

The fees paid to the concessionaires under the concession agreements include provisions for claims which may vary as the claims are resolved. Scottish Water has provided commentary on the variance in these costs including the impact of atypical costs on the annual charge.

Public sector capital equivalent value

The public sector capital equivalent values are reported to be taken from a report to the Transport and Environment Committee on 21 June 2001 adjusted by inflation. We have not had the opportunity to inspect a copy of the report or audit the base figures it contains. Scottish Water provided a copy of the base cost data used for each project including the cost base year and the inflation indices applied. The base figures have been inflated by either RPI or RPIX depending on the scheme. Construction cost inflation can vary significantly from retail price inflation. We believe that COPI may be a more appropriate inflation index for the public sector capital equivalent values. We recommend that WICS provides further advice on the inflation factors to be applied to the public sector capital equivalent values.

Contract information

The contract period and contract end dates are taken from the concession agreements.

Comments by Line

We have not further comment on the individual lines included in the return.

Comments by Confidence Grade

Scottish Water reports a D6 confidence grade against estimated direct operating costs and the public sector capital equivalent value (Lines E3a 1, 8, 16, 23 & 27. This is carried into the total cost lines in Lines E3a.7, 14, 22, 23 and 25. This reflects the use of data from historic financial models and other reports rather than current actual costs.

The Annual Charge in Line E3a.26 is given an B3 confidence grade. We note that an element of the reported expenditure is provisions for claims which may vary as the claims are resolved.

We consider the confidence grade of B3 for the total Scottish Water cost to be reasonable, taking account of the allocation of sludge and terminal pumping station costs.

7.5 Table E4: Water Explanatory Factors – Resources and Treatment

Commentary by REPORTER

Introduction

Key points

- This table reports on operational assets only. The methodology used is as in previous years. To improve asset data Scottish Water has carried out asset surveys covering 81 water treatment works and 82 groundwater sources. Changes to the asset inventory can be tracked.

- For AR 07, changes in the definition of WTW types (SD and W1-W4) have been implemented, resulting in 129 reclassifications.

- For AR 07 a change has been implemented in the counting of numbers of river and burn abstractions. In previous years, multiple intakes from a single surface water source were counted separately, even if close together. For AR 07 such intakes are counted as a single intake, resulting in a significant reduction in the reported number.

- Operating costs have been allocated through the ABM process described in Section 7.1.2. The reported costs reconcile to the resource and treatment costs reported in Table E1.

Methodology

The methodology is outlined under "Comments by Line" below.

Comments by Line

Lines 1 to 7: The table covers all treatment works that were in operation at any time during the report year.

Scottish Water has carried out a significant number of asset surveys, covering 81 WTWs and 82 groundwater sources. The results of all of the site surveys have been uploaded to Ellipse, which is the basic source of data on numbers, size, type and operational area. Ellipse updating was audited and is discussed in the commentary on Table H2. Scottish Water is able to identify the individual changes made in the year.

The total average daily output is the distribution input reported in Table A2. No allowance has been made for losses in the raw water transmission systems or treatment works losses. No data infilling was required on outputs for operational works in Table E4.

In general Scottish Water does not have records of the raw water output from individual sources. In the absence of this data, the distribution input from a treatment works served by multiple sources is attributed to all of the sources feeding it, which for AR 07 are counted as a single source. This has resulted in a reduction in the number of sources reported.

Lines 8 to 12: Source outputs are allocated to areas using the operational area designation held in Ellipse. Scottish Water continues to report against four operational areas, but intends to report against 8 areas from AR 08. The total volume of distribution input produced is consistent with the distribution input reported in Table A2.

Line 13: The same methodology was used this year as last year. Scottish Water has calculated the peak to average ratio for each operational area as:

$$\frac{\text{Overall Peak Week (7 day) distribution input in that operational area in the last 3 years}}{\text{The average distribution input for the year the peak week comes from in that operational area}}$$

Scottish Water used data from the last 3 years. The peak week is determined by calculating the average daily flow and summing this for each week, the maximum is selected for each area. For three areas the peak week occurred in 2003-04 and in the North West area the peak week occurred in 2004-05, this is the same as last year and therefore the reported figures are the same as for last year. They are not required to be split by area, the average figure only being required in AR07.

Line 14: Scottish Water has described its methodology for collecting pump information and determining average pumping head.

The average pumping head in each operational area is calculated as follows:

$$\text{Average Pumping head} = \frac{\sum (l_i * wp_i)}{d}$$

where:

$_i$ = each site at which pumping occurs

l = annual mean lift at the site (m)

wp = volume of water pumped at each site

d = distribution input for the operational area

The information on pumped volume and lift comes from the following sources:

- AR07 data obtained from Perform Spatial Plus (PSP). This is a database which contains logging data. The logging was carried out for DMAs and leakage studies. The data for each meter, which has a reference to pumping in its name, was related to a similarly named PS and this information used to calculate an annual average flow, by using recorded flow data between 01/04/06 and 31/03/07. Pressure logging is also used to calculate a head if available. This is the minimum pressure subtracted from the average pressure.

- AR07 data from the Distribution Input data, and from data from the Water Framework Team. Where a raw water pumping station or ground water pumping station is associated with a treatment works the flow has been assumed to be the distribution input if it was the only input to treatment, or has been allocated a proportion of the Distribution input for that works. For treated water pumps, the flow is allocated as a proportion of the distribution input: i.e. all, if all is pumped from the works by one PS, or as a proportion determined by the local asset planner. Lift information is also available from a spreadsheet produced and maintained by a member of the Water Framework Team.

The above takes precedence and then other data is used, in order of precedence as follows:

- AR07 Ellipse data. Lift data sourced directly from Scottish Water's corporate asset data.

- AR06 data which is measured and estimated figures updated for the AR06 annual return. Volumes and lifts are obtained from telemetry, site data and assumptions, OS data, meetings with operators and area coordinators.

- AR05 data is measured and estimated figures updated for AR05. Volumes are either measured or estimated from flow data and run times or other information.

- SR06 data was an update of data collected for the 2004 Annual Return. A key part of this investigation was to confirm where pumps pump from and to and confirm lift data. Pumped volumes are based on telemetry or average daily flow calculations. Energy efficiency audits were also carried out which allowed average daily flows to be updated.

- AR04 data used is where up dated information was not available.

Data is now infilled by two methods. Firstly using energy bill data, and then infilling the rest based on the average of the known data by band and area from the above sources.

274 pumping station sites were used to carry out a regression analysis to produce a linear relationship between energy consumed on the whole site and work done per year by the pumping station. This relationship was then used to calculate a figure for work done for those sites for which the energy consumed was known from electricity bills.

Average data was infilled where no other data source was available. The infill methodology for lift and volume was based on the PS power banding. Average lift and flow values for each operational area, by power band, were calculated from those already populated from the sources above. These average values were used to fill the final gaps.

There are no major changes to the general methodology compared to the previous report year. In the previous year the pumping station at Balmore Road was reported as four separate pumping stations on Ellipse. In the current year, this has been reported as one pumping station. The lift reported is an average calculated as a flow weighted average of the lifts for the flows to the four destinations.

Scottish Water has provided a breakdown of the data used in the analysis by source of data.

The pumping head is no longer required to be reported by area for Resources and Treatment. We note from the calculations provided at audit that in the North West the pumping head figure has more than doubled compared to the previous year, from 16.2 to 34. The reported pumping head in the North East has decreased from 24.4 to 23.8. The figure for the South East has decreased from 19.8 to 17.6m. There is a decrease in the South West, from 25.6 to 19.4. The average figure for the average pumping head has reduced from 23.8 to 21 in AR07. The changes are due to the new data from AR07 being used and changes in the asset inventory due to the data improvement programs which are ongoing.

Lines 15 to 19: Costs have been allocated to assets using the ABM process described in Section 6.1.2. The reported costs reconcile to the resource and treatment costs reported in Table E1.

The allocation of costs from ABM to individual assets takes account of the allocation of power costs between resource and treatment and distribution.

Resource and treatment costs are reported against treatment works size bands. Scottish Water allocates costs to resources and treatment works separately and must allocate resource costs to treatment works to complete Table E4. Where necessary, resource costs are allocated between treatment works in proportion to the design capacity of the treatment works.

Lines 20 to 25: For AR 07, changes in the definition of WTW types (SD and W 1-4) have been implemented, resulting in 129 reclassifications.

Lines 28 to 37: The number and type of treatment plant distributed by size band is consistent with the asset inventory recording operational assets only.

The works size is the design capacity taken from the asset inventory. In AR 06 it was noted that in a number of examples of smaller works the distribution input for the report year exceeds the design capacity. We recommended that Scottish Water review the design capacity of the plant on the asset inventory against the maximum capacity of the works. This does not appear to have been done.

Comments by Confidence Grade

We consider the confidence grades reported by Scottish Water to be reasonable with the following exceptions:

Lines 1 to 7: The reported confidence grade of C4 reflects the average daily input figures (consistent with the distribution input in Table A2). A higher confidence grade would be appropriate for the reported number of treatment works.

7.6 Table E6: Water Explanatory Factors – Distribution

Commentary by REPORTER

Introduction

Key points

- The information reported is generally consistent with other sections of the return including populations, properties and water supply in the A Tables and the asset inventory reported in the H Tables.
- We note an apparent discrepancy between the reported power costs for each operational area and the distribution input and average pump head. We recommend that this is investigated further.
- Operating costs have been allocated through the ABM process described in Section 6.1.2 and are reported in Table E1.

Methodology

The methodology is outlined under "Comments by Line" below.

Comments by Line

Line 1: The average resident population is the winter population distributed across the operational areas. Connected population was distributed based on estimates for each unitary authority areas. Where unitary authorities cross Scottish Water operational boundaries connected population was distributed by reference to spatially mapped OS address point data for domestic properties.

The total annual average resident population equals table A2 line 1.

Line 2: The reported total connected properties equals table A1 line 10.

Lines 3 & 4: The volumes of water delivered have been derived for each operational area using standard Scotland wide assumptions of per capita consumption, supply pipe leakage and water consumption per rateable value for unmeasured non-domestic properties. Only measured supply data is specific to each operational area.

The reported volume for households equals the sum of table A2 lines 12 and 13. The reported volume for non-households equals table A2 lines 14 and 15.

Line 5: Operational areas reported are the same as for AR 06. Scottish Water intends to report against 8 operational regions from AR 08.

Line 6: The number of supply zones is reported as the regulatory supply zones defined under the Water Supply (Water Quality) Scotland Regulations which came into force at the end of 2003. Regulatory supply zones must have no more than 100,000 population and may include one or more water supply zones fed from a service reservoir or downstream of an hydraulic discontinuity

Water supply zones are set for a calendar year. In previous returns Scottish Water has reported the number of supply zones in the calendar year at the start of the report year (the 2005-06 report was the 2005 calendar year). For 2006-07, Scottish Water has reported the number of supply zones in the calendar year at the end of the report year (354 zones in 2007). The number of zones in 2006 was 368. During the 2006 calendar year, 16 zones were deleted through amalgamation into other zones following rationalisation and two new zones were created due to the splitting of existing zones to remain within the 100.000 population ceiling. This reconciles to the 354 zones in the 2007 calendar year reported in line 6.

Lines 12-18: The lengths of main in various categories are taken from the corporate GIS. This is discussed in greater detail in the commentary on Table H3. The total length of main reported at line 16 differs from the length of potable water main in D5.8 and H3.4 by 2 km. The reported length does not include aqueducts or other types of main.

Systems for updating the data for development, renovation and new construction were examined for AR 06. Procedures have been formalised for updating records and, for rehabilitation work, contractors have direct access for updating following the completion of work. Quality assurance procedures are followed, version control records changes and validation routines are imposed before updated information becomes the accepted version.

The backlog of data entry for rehabilitation projects which was noted in last years report has been dealt with. As a result the length of unlined iron main recorded in Table E6 has fallen from 16307 km in AR06 to 14209 km in AR 07.

Line 19: The methodology for reporting bursts is commented under table B8. The burst data comes from two sources. The majority of data is extracted from the repair work orders recorded on the WAMS/Ellipse database and a small proportion from ongoing proactive leakage projects being carried out by Scottish Water Solutions. The combined data is then "cleansed" to remove work that is excluded by the WICS definition for B8.1. Duplications are also removed, where SW staff have been called out to support SWS

The number of bursts has been allocated between operational areas based on the post code on the work order. A very small number of records from WAMS do not have a geo-reference and these have been assigned to each area using other information in the records.

Line 20: Leakage is the balance between water delivered and the distribution input. Specific measurements of distribution input are made for each operational area. However, the assessment of water delivered relies on Scottish wide assumptions of per capita consumption supply pipe leakage and water consumption per rateable value for unmeasured non-domestic properties.

Line 21: Properties reported for low pressure matches that reported in Table B2.

Lines 22 to 24: Data for numbers and capacities of pumping stations is abstracted from Ellipse. The asset information is consistent with the asset inventory recording operational assets only. The geographic split is carried out based on operational area information held in Ellipse. Data infilling is carried out on pumping capacities by assuming that the spread of capacities among unknown sites is the same as the spread among known sites for that operational area. The proportion of missing capacity data is smaller among operational sites reported in Table E6 than among all sites (including non-operational), reported in Table H2. Pumping capacity is taken as design capacity recorded on Ellipse.

A further reduction has taken place in the number of pumping stations reported due to cleansing of data on the asset inventory and better information resulting from asset surveys at 499 sites.

Line 25: The methodology used to calculate average pumping head is described under Table E4.

As in the previous report year where a water treatment works has a distribution pumping station within the works site boundary, the opex costs have been reallocated to the water distribution activity within ABM.

For some operational areas the reported average pumping head and distribution input appears to be incompatible with the direct OPEX cost for power. For example for the SW operational area:

Average distribution pumping head (E6.16)	45.51	m
Distribution input (E4.5)	1325.5	Ml/d
	15341	l/s
Assumed total pump efficiency	70%	
Equivalent continuous running power	9778	kW
Estimated annual power consumption	85660	'000 kWhr
Estimated assumed average power cost	0.06	£/kWhr
Estimated distribution pumping power costs	5.140	£m

Reported direct power distribution (E1.2)	3.035	£m

A similar calculation for the SE area indicates distribution pumping costs are 31% of the total energy bill.

We note that further work undertaken by Scottish Water in the report year has resulted in an improved reconciliation between actual costs and the theoretical calculation outlined above. We suggest that Scottish Water considers a similar assessment for individual major pumping stations to determine whether the estimated pumping heads flows and known power costs and power consumption align.

Lines 26 to 29: Data for numbers, capacities and operational areas for service reservoirs and water towers is abstracted from Ellipse. During the report year 1576 surveys were carried out on service reservoirs and water towers, resulting in better asset knowledge.

The asset information is consistent with the asset inventory recording operational assets only. The geographic split is carried out based on operational area information held in Ellipse. Data infilling is carried out on capacities by assuming that the spread of capacities among unknown sites is the same as the spread among known sites for that operational area. This affects 12% of service reservoirs and 6% of water towers.

Comments by Confidence Grade

We consider the confidence grades reported by Scottish Water to be reasonable

7.7 Table E7: Wastewater Explanatory Factors – Sewerage

Commentary by REPORTER

Introduction

Key Points

- The information reported is generally consistent with other sections of the return.
- The drained area has increased slightly (E7.6). There is no apparent change in the extent of the sewerage system or the methodology used to calculate the drained area.
- Asset data on sewage pumping stations has been significantly improved through the carrying out of asset surveys at 1839 sites.

Methodology

The methodology is outlined under "Comments by Line" below.

Comments by Line

Line 1: The average resident connected population is the household population connected to the wastewater service reported in Line A2.8 distributed across the operational areas.

Line 2: The distribution of tourist population is made on the basis of average occupancy rates for different types of visitor accommodation. The allocation is prone to uncertainty due to the use of average bed spaces for different types of visitor accommodation and the possibility that visitor accommodation on the outskirts of built up areas will be connected to the sewerage system but not included within the drainage area boundary. The annual average figure is reported, consistent with the figures reported in Table A2.

Line 3: Scottish Waters methodology for calculating average flow is generally the same method as last year. The calculation is in two parts: the assessment of flow in dry weather; and a calculation of storm run-off.

For both dry-weather and storm flows sample catchment analysis is used to generate flow factors which are then applied to all drainage areas across Scotland. The analysis does not distinguish between regions. The data used is slightly different from that used last year. For dry weather flow, flow survey information from 28 additional works has been added to the DWF assessment, and recorded data from 38 works is now used in this assessment.

Dry-weather flow

The dry-weather flow has been assessed from flow records at a small sample of works. The sample was selected as works with good continuous flow records and rainfall data, and others where a flow and rainfall survey has been carried out for a development constraints project. As a result, the updated sample consisted of 10 PFI works and a further 28 works where the flow survey was assessed to contain dry day information. The additional works included in this year's analysis range in size from a population of around 150 at Dullatur WwTW to 226496 at Shieldhall WwTW.

The increase in the sample of works used from the previous year increases confidence in the analysis. However, continuing to rely on a small sample of works limits confidence in the overall result and may create a geographic bias.

The dry weather data selected might not meet a typical definition of dry-weather flow which is usually measured after a week with virtually no rain. It is possible that the results contain an element of storm-water run-off.

PFI schemes at coastal sites may also include storm water storage to limit intermittent discharges. This retained flow will be returned to the main sewer for treatment after the storm subsides. It is likely that some of this retained storm water is included in the dry-weather flow estimate.

The dry-weather flow per head per day is calculated for each works and an average figure calculated. The calculated values for the sample works ranged from 0.022 to 5.099m3/head/day and resulted in an average of 0.620m^3/h/d.

The estimate of dry-weather flow used in the assessment was lower than that in the previous year, but appears high. It is closer to a typical 3 DWF than a dry-weather flow and may indicate that significant quantities of storm water are included in the dry-weather flow estimate.

We recommend that Scottish Water continues to expand the data set used in the analysis and seeks to screen the data to exclude possible storm water contribution.

Storm flow

Storm flow has been determined as the run-off predicted by a sample of existing sewer models. The data is used to generate average storm run-off factor in terms of m3 per mm of rainfall per hectare of sewered area.

The range of predicted run-off from the models used appears to be reasonable. The sample of models used to generate the data has been increased (38 DAPs as opposed to 12 in the previous year). We recommend that Scottish Water collects this data as a matter of course

from all on-going modelling work. We recommend that once an expanded data set is available the analysis should be regionalised.

We understand that the assessment of storm flow is based on models of the main sewerage system draining foul and combined wastewater to treatment works only. As a result, the reported data excludes flows to separate storm-water sewers which discharge direct to water courses, which is included in the line definition.

Calculation of volume of sewage collected

The volume of sewage collected is the combination of estimated dry-weather flow and storm flows calculated as follows:

- The dry-weather flow factor described multiplied by the resident population.
- The storm flow factor described above, multiplied by the sewered area, multiplied by the average rainfall in the report year.

Reported flows have increased from the previous year due to increased rainfall, despite the reduction in flow factors from the increased sample of works and catchments considered.

Line 4: The number of connected properties is obtained from an analysis of OS address point data in each operational area. This figure is then factored up to reconcile with the total number of properties which was calculated for the base information for the A tables. This figure matches the total figure in table A1 line 21 applied across each operational area.

Line 5: The area of sewerage district is the operational area. The areas are slightly greater than last year. SW stated that this was due to a more accurate drawing of the boundaries from which the areas are calculated.

The areas are about 0.5% lower than the equivalent water operating area for reasons we have not understood.

Line 6: The drained area is measured from the sewered area boundaries on the GIS system. Some new developments are on the edge of or outside previous sewered area boundaries, the boundary is updated to account for this, hence there is an increase from last year.

Line 7: Annual precipitation is calculated in the same way as last year, from data obtained from the website of the Centre for Environmental Hydrology, the source of the data is the Met Office. The CEH report a monthly rainfall depth for the 7 former River Purification Board areas, covering the whole of Scotland. This data is then applied to the relevant operational area. Overall, the data shows that 2006-07 was a wetter year than the 1960 -1991 average but that the summer was drier than average.

Line 8: The overall length of sewer reconciles with the asset inventory and includes critical and non-critical sewers, laterals, pumping mains and an allowance against under reporting of existing connected properties on the corporate GIS. The length of sewer has been allocated to each area on the basis of the sewerage stock recorded on the corporate GIS.

Line 9: For the report year Scottish Water has followed the same method as for AR06 to estimate the length of lateral sewer by area. Data from a survey carried out to determine the average length of lateral sewer which used to calculate different average lengths of lateral sewer for different types of property. The average lengths were applied to This allowed the allocation of lateral length to be made on the basis of property type to reflect both different lengths of lateral sewer and differences in the number of multi-occupancy properties in different areas.

Line 10 – 12: The length of the various categories of sewer are taken from the asset database developed from the corporate GIS which is used to complete the asset inventory. The length of separate foul sewer is not included in these categories and is not reported separately in table E7. An additional 500 km of stormwater sewer is included to account for sewers which are likely to exist but are not on GIS.

Line 13: In 2004/05 Scottish Water updated its assessment of critical sewerage by undertaking a comprehensive assessment based on a defined rule set applied through the GIS system. This method was updated further in AR06. All sewers which were identified in AR06 as critical remain so in AR07. In addition any new sewers which were categorised as critical if:

- they have a diameter >450 for foul sewers;
- They have a diameter >600 for storm sewers;
- their depth is > 4m; or,
- they are masonry or brick

Scottish Water recognises that methodology applied in AR06, had some limitations. We believe that these limitations include:

- The data infill rules used to complete the population of key sewerage data.
- The interpretation of Sewer Rehabilitation Manual rules which relate criticality to surface features.
- The lack of key information such as traffic flows and soil conditions which have either been omitted from the assessment or inferred from other data.
- Different assumptions or additional information would result in a different results and this is reflected in the confidence grade.

- In addition new sewers added to GIS are now identified as critical by a slightly different method.

Line 14: The methodology for determining sewer collapses is the same as for AR06, with data being obtained via the WAMS/Ellipse database. The work orders are attached to addresses not assets. The address is generally the address of the customer reporting the problem. The system generates a location code based on the address and this code is then used to allocate problems to report areas. There were 22 reports without location codes. These collapses have been spread pro-rata to the four areas. This figure matches that in Table B8.

Lines 15 to 16a: Data for numbers and capacities of pumping stations is abstracted from Ellipse. The asset information is consistent with the asset inventory recording operational assets only. The geographic split is carried out based on operational area information held in Ellipse. Data infilling is carried out on pumping capacities by assuming that the spread of capacities among unknown sites is the same as the spread among known sites for that operational area. The proportion of missing capacity data is smaller among operational sites reported in Table E7 than among all sites (including non-operational sites) reported in Table H5. Pumping capacity is taken as design capacity on Ellipse.

The asset data is consistent with the asset inventory reporting operational assets only. The total number has increased since last year, the net effect of abandonment's and new construction. Pumping stations operated under PFI concessions have been excluded.

Asset surveys were carried out at 1839 sites during the report year resulting in an improvement in asset data.

Details of pumping station capacity are taken from the asset inventory and include a significant quantity of missing data which has been infilled in proportion to known data.

Line 17: The process for calculating the average pumping head is different from in the previous return. The method now follows generally the same method as that carried out for water pumping stations.

Data for lift and kW rating comes from Ellipse. If the data is missing in Ellipse, then data is taken from the following sources in the following order of precedence:

- From data used in AR06 for lift and flow
- From data used in AR05 for lift and flow
- From gap filling where the average lift and flow figures in each size band are calculated from the known figures from the above sources, and applied to those unknown.

The design capacity is taken from the figures used for AR06, and infilled based on the average of the known data, as per lift and flow. The figures are reduced from the previous return, and 80% have been infilled for design capacity.

For the pumping head calculation the work done which is the sum of the lift times the flow for each site in each operational area is divided by the sewerage volume for each operational area as reported in Line 3 of this table.

Lines 18 to 21: The number and capacity of pumping stations is allotted to the combined or stormwater categories according to data held on Ellipse. This categorisation has been improved by the asset surveys noted above.

Lines 22 to 23: In the report year the company has reported the number of CSOs consistent with Table H4 but excluding those discharges which occur from sewage treatment works (4375).

In 2005-06 the company reported the number of overflows in table D6 (3900). The equivalent data in the current report (table B8 line 13 includes 3088 UIDs not located on sewage treatment works. The number was established after a GIS harmonisation project in 2006/07 identified incorrect and outdated information on the intermittent discharge asset inventory. The reported number excludes overflows at sewage treatment works and emergency overflows from pumping stations. This partially explains the difference between the number reported in table E7 and the number of CSOs reported in table H4. Table H4 may also include redundant assets yet to be cleansed from the data set.

Lines 24 and 25: The number of operational sewage treatment works reconciles with that in Table E8 line 8. The number of treatment works and reported loads exclude PPP. The total load is consistent with the load reported in table A2.

Comments by Confidence Grade

We consider the confidence grades reported by Scottish Water to be reasonable with the following exceptions:

Line 13: We recommend a confidence grade of B4 on the length of critical sewer to account for the data infill, interpretation of SRM rules and gaps in the specific data required to complete the assessment.

7.8 Table E8: Sewerage Explanatory Factors – Sewage Treatment Works

Commentary by REPORTER

Introduction

Key points

- The data sources are consistent with other sections of the return, including the populations and loads in Section A and the asset inventory in Section H.
- The data excludes PPP treatment plant.
- Operating costs have been allocated through the ABM process described in Section 6.1.2.

Comments on Methodology

Scottish Water has compiled a spreadsheet that holds data on all treated and untreated continuous discharges, it also contains data for operational and non-operational assets and PFI works. Data on discharges was initially compiled from legacy systems of the three predecessor authorities. The list of works and discharges is continually reviewed by Asset Planners to ensure that it is updated to correct errors in historic data and take account of improvements in the year. The works reported in Table E8 are those in operation and not including PFI works at the end of the report year.

The reported loads in this Return are based on Scottish Water's current assessment of resident and visitor populations, trade effluent loads and tanker loads discharged to individual treatment works. Details of the methodology are provided in Table A2.

The reported loads are consistent with Table A2, apart from one location discussed below.

The asset data is consistent with the data in Table H5 with the following exceptions:

- Table E8 includes operational works only. Table H5 includes all assets including redundant and decommissioned assets.
- Table E8 includes unscreened sea outfalls that have no treatment asset and are not included in Table H5.
- Works banding in Table E8 is based on estimated load to the works. The works banding for table H5 is based on the nominal design capacity of the works.

Compliance data is extracted from a SEPA report supplied to SW by SEPA and covers the calendar year.

Comments by Line

Lines 1 to 20: The data in Table E8 lines 1 to 20 was taken from the company's analysis of treatment works loads which includes data on all treated and untreated continuous discharges. During our audit we were able to confirm the calculation of costs in the various categories reported in the table.

PPP works are not included in reported data in table E8.

Table E8 includes one unscreened sea-outfall which was not included in the previous year's return. This is a major outfall operated by Scottish Water which receives a minor contribution from Scottish Water assets and also receives a major treated flow from an industrial discharger. Scottish Water has included the asset and load to represent the operational costs of the asset in the explanatory factors.

Lines 11 to 20: The total load is consistent with the load reported in table A2, subject to the fact that septic tank loads are excluded from the totals in table E8.

Lines 21-30: The compliance report does not include performance against the UWWTD standards included in the consents or licences. These UWWTD consent limits may be more onerous than the other consent limits included in the analysis.

Lines 31 to 42: Costs have been allocated to assets using the ABM process described in Section 7.1.2. The costs are consistent with the direct costs and functional expenditure reported in Table E2 for sewage treatment.

In the report year general and support expenditure has been distributed between treatment works in proportion to the direct employment costs allocated. This was done on the assumption that general and support expenditure is mainly to support staff as opposed to other expenditure. In previous years general and support expenditure was allocated in proportion to load. The change in methodology results in approximately £2.8 million more general and support expenditure allocated to small works than under the previous methodology.

Comments by Confidence Grade

We consider that the confidence grades reported by Scottish Water are reasonable.

7.9 Table E9: Large Sewage Treatment Works Information Database

Commentary by REPORTER

Introduction

Key points

- 21 large treatment works are reported. The report excludes the PPP works.
- The data sources are consistent with other sections of the return, including the sewage loads in Section A.
- Operating costs have been allocated through the ABM process described in Section 6.1.2.

Comments on Methodology

The size of works has been determined by the population equivalent of the total load received (E9.1). The load received is calculated using the same methodology described for Table A2.

One works, Iron Mill Bay, which was included in the 2005-06 is not included in the large works report this year. The area served and the population equivalent was revised downwards follow a review of the data which established that part of the sewered area previously reported drains to Dunfermline STW. The revised population equivalent for Iron Mill Bay is 18,800.

The table has been revised from the 2005/06 return to exclude measured flow and load data.

Comments by Line

Line 1	Reports the population equivalent rounded to the nearest 1000.
Lines 2 to 6	The reported consent parameters excludes UWWTD consent parameters. The UWWTD consent conditions may be more onerous that the other conditions of the consent or licence.
Line 7:	The reported data is the number of sample failure against the look-up table consent limits in the COPA section of the consent. This is consistent with the approach adopted for Table E3 and E8.
Lines 8 to 14:	Treatment works category information is consistent with previous years.
Lines 15-19	Costs have been allocated to assets using the ABM process described in Section 7.1.2. The costs are consistent with the direct costs and functional expenditure reported in Table E2 for sewage treatment. In the report year general and support expenditure has been distributed between treatment works in proportion to the direct employment costs

allocated. This was done on the assumption that general and support expenditure is mainly to support staff as opposed to other expenditure. In previous years general and support expenditure was allocated in proportion to load. The change in methodology results in approximately £2.8 million less general and support expenditure allocated to large works than under the previous methodology

Comments by Confidence Grade

We consider the confidence grades reported by Scottish Water to be reasonable.

7.10 Table E10 – Sludge Treatment and Disposal

Sludge treatment and disposal is reported for sludge treated and recycled or disposed of from Scottish Water's operational sites, excluding sludge disposed of by PPP concessions.

The resident population reported in the total for Scottish Water treatment works and is incompatible with the sludge quantities.

The sludge quantities are compatible with the quantities reported in tables A2 and E3. The quantities reported are the estimated quantities of sludge produced before treatment.

Total operating costs for sludge treatment and disposal have been allocated through the ABM process described in Section 7.1.2.

In previous returns sludge costs have been distributed between outlets in proportion to sludge quantity. In the report year total sludge costs have been distributed in proportion to a disposal and cost model, providing a more robust allocation of cost between outlets.

Sludge treatment costs have increased from £8.7 million in 2005-06 to £9.2 million in 2006-07 (an increase in cash terms of 5.5%). The estimated sludge quantity has reduced from 26.8 ttds in 2005-06 to 21.8 ttds in 2006-07 (a reduction of 18.5%). The average unit rate for sludge disposal has increased by 29%.

Comment on Methodology

The methodology for estimating and allocating sludge production is outlined in our report on table A2.

The sludge quantities and sludge disposal costs reported in this table are limited to sludge disposed of by Scottish Water. It excludes sludge disposed of through PPP concessions.

The resident population reported in the total resident population served by Scottish Water treatment works and excludes resident population served by PPP works. Much of the sludge from this population is treated and disposed of through PPP concessions including Daldowie. We recommend that Scottish Water reviews the figures to ensure that the resident population reported is compatible with the sludge quantities and costs.

We note that the reported figures indicate a very low sludge production per resident population for sludge disposed of through composting. This may be due to the need to allocate resident population to PPP plants in line with sludge disposal.

We note that the equivalent report in England and Wales (table 17g of the June Returns) requires companies to include grit and screenings quantities in the reported sludge quantity. We have not established whether this is done consistently or whether the costs of screenings and grit disposal are also included. Scottish Water does not include quantities or costs of grit or screenings disposal in table E10. We suggest that this is considered in any comparative analysis considered with data from England and Wales.

Operating costs have been allocated through the ABM process described in Section 7.1.2. The costs are consistent with the direct costs and functional expenditure reported in Table E2 for sludge treatment.

For the report year £1.7 million has been reallocated to PPP sludge costs in Table 3a to reflect the costs incurred by Scottish Water in transporting sludge from its own works to PPP plant for treatment. This aims to ensure that the costs of treatment is aligned with the sludge quantity reported for the purpose of comparative efficiency. It follows the methodology introduced in 2005-06.

The allocation of cost to PFI sites is based on a driver "weighted waste movements". The driver is based on the number of sludge movements for Scottish Water operational sites and to PFI sites for each operational area. The number of movements is weighted by the split of costs of sludge movements from a sludge transport and cost model developed by Scottish Water to manage sludge handling. There is a reasonable comparison of model and ABM interstage tankering costs suggesting that the basis of the weighting is reasonable.

Scottish Water disposes of sludge generated by one PPP concession. The cost of this sludge disposal is included in the reported costs. The quantity of sludge remains in the quantities reported for the PPP concession. We recommend that this is reviewed to ensure that sludge quantities and costs align for the quantities reported in table E10.

In previous report years, the total cost of sludge treatment and disposal was allocated in proportion to sludge quantity. This resulted in the same unit rate for sludge treatment and disposal irrespective of the outlet. In the report year, Scottish Water has allocated the estimate total sludge cost between outlets in proportion to a sludge "model" which sets out the basis for sludge collection routes, quantities, and disposal routes. The model is a mix of estimated and actual quantities, planned and actual routes and actual and estimated costs rates. The method adopted in the report year is a significant improvement on previous years. It has a material impact on the cost of sludge allocated to each disposal route.

The change in disposal outlets for sludge in the report year is summarised below:

Outlet	**Ttds**			**%**
	2005-06	**2006-07**	**Variance**	
Farmland Untreated	0.000	0.000	0.000	
Farmland Conventional	9.631	6.667	-2.964	-31%
Farmland Advanced	3.805	9.601	5.796	152%
Incineration	0.000	0.000	0.000	
Landfill	2.232	2.106	-0.126	-6%
Composted	1.510	0.255	-1.255	-83%
Land Reclamation	9.797	3.195	-6.602	-67%
Other	0.000	0.000	0.000	
Total	26.975	21.824	-5.151	-19%

There has been a general reduction in sludge quantity of 19% (see our report on table A2). The major movement in sludge disposal outlets has been from land reclamation to farmland advanced. The land reclamation outlet continues to decline follow changes to application rules by SEPA. The increase in farmland advanced reflects an increasing use of limed sludge treatment in place of disposal to land reclamation and other treatment and disposal options.

Comments by Line

Lines 1 to 2 The quantity of sludge and the associated resident population served are taken from Scottish Water's Sludge Model which records and tracks sludge from point of production to point of disposal.

The reported quantity of sludge is the estimated raw sludge production before it is treated. Treatment processes applied can result in some reduction in sludge mass.

The quantity of sludge reported is that treated and recycled or disposed of from Scottish water operational sites only

The reported resident population served is the resident population associated for all treatment works operated by Scottish Water and excludes PPP works. It is not compatible with the sludge quantities disposed of by Scottish Water included in table E10.

We were able to follow an audit trail through the data to the reported quantities by outlet.

Lines 3-11 Operating costs have been allocated through the ABM process described in Section 6.1.2.

The ABM system provides an allocation of costs to sludge treatment in each operational area. It does not allocate costs to individual assets or the associated disposal categories.

Direct costs were allocated between sludge outlets in proportion to cost estimates on the sludge model used by Scottish Water in the management of sludge treatment and disposal.

General and support costs (from table E2) were allocated between outlets in proportion to the direct costs.

The total cost is consistent with the costs in Table E2 – Sludge Treatment.

Comments by Confidence Grade

We consider that the confidence grades reported by Scottish Water are reasonable with the following exceptions:

Line 1: We believe that the confidence grade is appropriate for the methodology adopted. However, we note that the reported resident population does

not relate to the reported sludge quantities. On this basis a significantly lower confidence grade would be appropriate.

Line 2: We recommend a confidence grade of B4 for the sludge quantities against individual works, to reflect the uncertainty associated with measurement and the factors applied to convert to raw sludge quantities.

Lines 3 to 9 We believe that a B3 confidence grade is appropriate for the total costs allocations. We suggest a B4 confidence grade for the allocation of costs between outlets to reflect the reliance on the sludge model to distribute costs.

7.11 Table E11: Operating Costs and Efficiency– Management & General

Commentary by REPORTER

Introduction

Key Points

- Employee numbers include staff who are directly employed by Scottish Water. They exclude staff employed in capital projects, staff seconded to SWS, staff transferred to SWBS from 01 November 2006, non core staff and agency staff. Part time staff are included as part time equivalents.

- For our detailed commentary on Management and General assets see our commentary on Table H6.

- Areas of offices, depots and laboratories should be considered to be uncertain. Scottish Water has begun a programme of asset surveys for property, including a reassessment of floor area as well as condition grade. However reassessed floor areas have not been reported in the table for AR 07.

- Property valuations have been carried forward from previous years with COPI updating for inflation. Scottish Water accepts that approach to property values requires improvement and proposes to carry out revaluation using qualified chartered surveyors for owned properties for the next Business Plan.

- We have decided not to audit vehicles and plant and telemetry this year.

Comments on Methodology

Employee numbers

Employee numbers have been obtained from the payroll system.

The payroll system comprises a database of all Scottish Water staff including: permanent staff, temporary staff, staff seconded to Scottish Water Solutions and non core staff. Agency staff are billed direct to departments or projects and are not included on the database.

Every staff member is expressed as a "full time equivalent" (FTE). Thus a temporary staff member who works for 50% of each month will be recorded as 0.5FTE. Every staff member is assigned to a department. A combination of department codes and ABM outputs are used to assign staff to the core business and non core business and lines E11.1 to E11.3.

The following departments are allocated to lines E11.1 to E11.3 in proportion to the costs recorded in tables E1 and E2 as follows:

1. Direct operations: Employment costs in tables E1 and E2

2. General and support: General and support costs in lines E1.9 and E2.8

3.	Other	Customer services – costs in lines E1.11 and E2.10
		Scientific services – costs in lines E1.12 and E2.11
		Other Business Activities – costs in lines E1.13 and E2.12

The allocation between the water and wastewater sectors is undertaken on the basis of employee costs following overhead allocations using the ABM system. This method is used because staff reporting has to be consistent with expenditure reports and there is increasing multi-tasking between services and using department codes would not be accurate. This is accepted.

Each month a FTE report is prepared from the payroll system. Each report is checked by the management accountants to ensure that the payroll system reflects any changes that are known to the management accountants. The 12 reports for the year are averaged to give the results for Table E11.

The FTE report is adjusted as follows to give the report for Table E11:

- Secondees to SWS are removed
- Staff transferred to SWBS are removed from 01 November 2006.
- PFI staff are removed
- Staff involved in the non-core business are removed. These comprise staff involved in waste services, property services, contract services and commercial business development. This is done based on % of staff costs that are non-core.
- Finally, all staff who are recharged to capital projects are removed. This is done on the basis of staff costs.

We believe that the figures generally give a proper representation of Scottish Water's operations staff but it should be noted that:

- they exclude all staff involved in capital projects; given that the numbers should be consistent with employment costs reported in the other E tables this is believed to be correct.
- they do not include staff hired through agencies. Scottish Water reports that the latter is small as Scottish Water does not encourage the use of agency staff; and
- The reduction for capitalised staff is applied equally to all groups which may give rise to some small anomalies in the detail: for example scientific services has been reduced by the same standard percentage as others although scientific services is likely to be fully employed in operations rather than capital projects.

Properties

The basic data source for property returns is the spreadsheet maintained by Property Facilities. This covers properties managed by Estates (legal title, farms, forestry and houses), Property Facilities (non-operational buildings) and Property Maintenance (operational buildings). The spreadsheet is not a live document, but revisited annually for the Annual Return, when known changes are made. A closure programme is under way and it is not clear that the spreadsheet is fully up-to-date in this respect, as it contains buildings with proposed closure dates which have already passed. Scottish Water accepts that there would be value in re-basing the list.

Offices are defined as buildings having more than 100 workstations. The 11 offices include Watermark House which is leased by Scottish Water (and who are liable for its maintenance) although SWS are using it. Offices with 100 or fewer workstations are reported as depots. Scottish Water reports that it does not have any separate workshops, although some depots have limited workshop facilities.

The number of depots and workshops reported at line E11.9 (68 properties in use, including 5 leased) is consistent with the 68 expected to be reported at line H 6.2 in the final version of the Table H6 (68 owned properties, including 5 no longer in use)

Numbers of properties are unchanged from last year. Asset surveys carried out during the report year re-measured floor areas for 47 properties but these have not been revised in the table. Scottish Water expects to show amended floor areas for all properties following the completion of the asset survey programme in report year AR 08.

Information Systems

The basic data source for is the live IS inventory. This is maintained up-to-date on a day-by-day basis and is a live management tool. Data for AR 07 were obtained by taking a download of the database on 31.3.07. All IS assets are allocated to offices, not people, although the whereabouts of portable items such as laptops can be determined each time they log on. This database justifies the allocated confidence grade of A2 for asset stock.

The database lists comprehensive information on each asset including; site reference, asset ID and categorisation, reference number, model name, date delivered, condition and performance grade, EARC, life categorisation, criticality, gross EARC and age.

In AR 07 for the first time differing categorisations are used for IS assets in Tables E and H. In practice Mainframes, Workstations and PCs in Table E are taken as being equivalent to Servers, Desktops and Laptops in Table H.

Comments by Line

Lines 1 to 4: Includes staff who are directly employed by Scottish Water. Excludes staff employed in capital projects, staff seconded to SWS, non core staff and agency staff. Part time staff are included as part time equivalents.

We note that since last year overall staff numbers have declined by approximately 11%, with the greatest reduction being in the wastewater service (approximately 16%)

Lines 5, 7, 9 & 13: The numbers of offices, depots and control centres are double counted, being shown against both the water service and the wastewater service. Numbers of laboratories have however been allocated to services.

Lines 6,8,10 & 14: Areas of offices and laboratories have been allocated to water and wastewater services in the same ratio as employee numbers in these services. This ratio has changed since AR 06. Areas of depots and control centres are double counted, being shown against both the water service and the wastewater service.

Lines 11 & 12: Scottish Water has no separate workshops, although some depots do have limited workshop facilities.

Lines 15 to 17: These lines have not been audited this year.

Lines 18 to 20: Servers and mainframes are double counted in the table, appearing against both water and wastewater services. Scottish Water explains that this is because they are used by staff from both services. On line 18 a partial attempt has been made to distinguish between services, but the large majority of PCs are also double counted, giving numbers which are inconsistent between services and also inconsistent in total with the number given at line 6. Although WIC expects double counting in these lines we are surprised at the very high numbers of PC's appearing in both services. Given that the normal user is known for all PCs it may be worth checking this allocation.

The reduction in numbers in Line 20 is consistent with the statement made last year that Scottish Water planned to de-commission a number of mainframes.

Comments by Confidence Grade

Confidence grades for properties and information systems assets are generally consistent between Table E11 and Table H6. The exception is the grades relating to the control centre. In Table E11 the number of control centres (1) is given a confidence grade of A1 and the area of the control centre a confidence grade of C3. In Table H6 however the number of control centres and the floor area are jointly given a confidence grade of A2. The reason for this discrepancy is not clear.

8. SECTION G – INVESTMENT PLAN

8.1 Overview

Scottish Water has populated tables G5 and G6 with detailed project information which is summarised in tables G1 to G4.

The company reports substantial completion of Q&S2 outputs in table G7. The on-going completion projects are focused on a limited number of projects which have subject to critical 3rd party issues.

Scottish Water reports delivery of its outputs for year 1 of Q&S3 and has met the targets in its Delivery Plan subject to minor exceptions. The company has general met or exceeded its serviceability targets.

We have undertaken audits of projects and programmes of work which are reported in tables G5 and G6. We have carried out an audit of the transfer of data within the G tables and the consistency of outputs reported in the B and D tables. We have also reviewed the consistency between the G tables and the Capital Investment Return, the revised WIC 18 programme for Q&S2 and table K56 from the Annual Return 2005-06.

Key points

- The detailed project report in tables G5 and G6 is the same as that in the capital investment return for 2006-07 Q4 except that the CIR for Q&S2 included an adjustment line which is not included in table G5, see below.

- Where specific project estimates have been developed, we concluded that robust systems were in place for estimating future expenditure profiles. Where possible, projections are based on detailed project programmes. Risk analysis has been undertaken both at project and programme level and has been accounted for in both outturn cost and profile.

- The continues to be significant issues in some Q&S2 completion projects relating to definition of project scope or the required permissions to complete the works which may result in further cost escalation and/or delay to project completion.

- A significant part of the Q&S3 programme remains in development and there remains a high degree of uncertainty in the estimated expenditure projections on individual projects and the programme as a whole.

- We reviewed the Q&S3 3rd party risk management processes and concluded that Scottish Water has learnt from issues arising in Q&S2 and has put sound processes in place to minimise and manage these risks. Despite this, it is likely that some 3rd party risks will materialise causing delay and cost escalation to the projects affected.

- The expenditure projections for 2007-08 and the successful completion of the programme as a whole is dependent on taking a significant number and value of projects through the CAPEX3 approval stage over the summer of 2007. The company has recognised this issue and has established sub-programme action plans

to manage projects through the approvals process. However, the high run rate of approvals through the summer remains a key risk to the delivery of the investment plan summarised in table G6.

- In some cases in table G6, programmes of work have been rolled up into programme holding lines. As individual project estimates are prepared they are reported as individual project lines and the programme holding line budget altered as necessary. In some cases, such as the UID programme, the company has carried out significant development work which indicates that overall cost is likely to be greater than that allocated in table K56. However, has chosen not to report these developing estimates until it has completed its investigations as a whole, agreed the outcome with regulators and has reasonable certainty on the revised estimate.

- A small budget remains in a Q&S2 quality holding line for completion of improvements to Loch Ryan following resolution of the required discharge standards, discharge location and scope of works. The budget will not be sufficient to cover the estimated costs of the expected scope of works.

- The expenditure projections for Q&S3 include an overhang beyond 2009-10. Part of the estimated overhang is based on specific project assessments, the remainder is included in sub-holding programme lines (in particular, the water quality, wastewater quality and UID programmes) and reflects management view of risks to progress of the programme.

- We have not been able to establish that a consistent approach has been taken to inflation in the expenditure profiles reported in the holding lines in table G6.

Compatibility with the CIR.

In the report year the CIR has been divided into completion of the Q&S2 programme and the Q&S3 programme. A comparison of the totals for the two programmes with the table G5 and G6 are set out below:

Comparison of Q&S2 programme (table G5) with the CIR

	2006-07	2007-08	2008-09	2009-10	Post 09/10
Table G5 expenditure profile	173.076	80.803	35.239	10.649	-0.117
CIR expenditure profile	173.076	58.768	55.239	12.684	0.000
Difference CIR – table G5	0.000	-22.035	20.000	2.035	0.117

The CIR for the completion of Q&S2 contains an adjustment line reflecting the opinion of Scottish Water management on overall future progress of the completion programme. The adjustment reflects an overview of programme risks which might not be accounted for in individual project assessments. It allows for delay of £22 million currently included in project budgets for 2007-08. The main risks underlying this judgement are

In addition, the project analysis in G5 allows for -£0.117 spend post 2009/10. We believe that this is the sum of rounding errors on individual project analyses.

Comparison of Q&S3 programme (table G6) with the CIR

	2006-07	2007-08	2008-09	2009-10	Post 09/10
Table G5 expenditure profile	240.211	573.209	635.837	622.004	80.653
CIR expenditure profile	240.211	573.209	635.837	622.004	80.653
Difference CIR – table G5	0.000	0.000	0.000	0.000	0.000

Scottish Water has made no programme level adjustment to the individual project figures in either the CIR or table G6. The sub-programme holding lines include a management assessment of potential delays to expenditure which is not accounted for in individual project assessments.

8.2 Tables G1 & G2 – Investment Plan Summaries

Commentary by REPORTER

Tables G1 and G2 summarise the investment reported at project level in tables G5 and G6 by purpose code.

CAPEX reported in tables G1 and G2 is carried forward from tables G5 and G6. We were able to reconcile the capital expenditure between the tables with minor exceptions.

Tables G1 and G2 summarises expenditure in the four years 2006-10. For the Q&S3 programme, Scottish Water also reports expenditure of £24.3 million in 2005-06 and £80.65 million post 2009-10.

Expenditure is estimated in money of the day allowing for inflation. We have not identified a clear audit trail showing a consistent application of inflation across the programme.

We have commented on the allocation of CAPEX to purpose codes under tables G5 and G6. The allocation continues to follow the method adopted in Q&S2. Any allocation to capital maintenance is assessed. In the absence of better information, the allocation made for the business plan submission is adopted. The remaining cost allocation is usually divided equally across the quality or other drivers. We understand that Scottish Water is working with WICS to consider alternative allocation methods to take account of the purpose of specific parts of the project.

Additional OPEX for the quality programme is carried forward from the totals in tables G3 and G4. The allocation of expenditure between years is based on the beneficial use date which is earlier than the CAPEX5 completion date shown in table G5 and G6. The additional OPEX is estimated amount over and above that incurred in the previous year. We recommend that WICS provides further advice on whether this is the correct approach or whether the cumulative opex from the base year for the business plan should be reported.

The negative value of the SWS share account is allocated equally between the four areas of asset maintenance, although it relates to all elements of the programme.

Comments by Line

Line 1 — We understand that the base operational expenditure for 2006-07 should be the total operating expenditure for the year less the additional operational expenditure in the report year. We have not been able to reconcile the base opex with table E1.

The company has not estimated base operating expenditure for future years.

Line 19 — Grants and contributions are those received and accounted for in the report year. The company has not estimated grants and contributions for future years.

Line 20 — The company has not estimated adopted assets and assets acquired at nil cost for future years.

Comment by confidence grade

Scottish Water generally reports a confidence grade of B3 for capital expenditure estimates for the report year and for future years. We believe that this is a reasonable reflection of cost allocation by purpose in the report year. We suggest that a confidence grade of C4 is applied to future years to reflect the inclusion of projections for projects yet to be confirmed and the risks to progress on individual schemes and the programme as a whole.

8.3 Tables G3a & G3b – Q&S2 Delivery

Commentary by REPORTER

Introduction

Tables G3a and G3b summarises the investment reported at project level of table G5 by quality driver.

Total expenditure in table G3a line 25 reconciles to the sum of net expenditure in table G1 line 21 and grants and contributions in table G1 line 19. Total expenditure in table G3b line 37 reconciles to the sum of net expenditure in table G2 line 21 and grants and contributions in table G2 line 19.

The allocation of expenditure by driver and year reconciles to the detailed project data in table G5.

We have commented on the allocation of CAPEX by output measures under table G5. A more robust allocation based on an analysis of project scope and expenditure would be needed to provide more reliable allocations.

Comments by line

None

Comments by confidence grade

The company generally reports a B3 confidence grade for expenditure by individual quality drivers. Given the equal allocation of expenditure between drivers on individual projects, we suggest a B4 confidence grade.

8.4 Tables G4a & G4b – Q&S3 Drivers

Commentary by REPORTER

Introduction

Tables G4a and G4b summarises the investment reported at project level of table G6 by quality driver.

Total expenditure in table G4a line 47 reconciles to the sum of net expenditure in table G1 line 21 and grants and contributions in table G1 line 19. Total expenditure in table G4b line 37 reconciles to the sum of net expenditure in table G2 line 21 and grants and contributions in table G2 line 19.

The allocation of expenditure by driver and year reconciles to the detailed project data in table G6.

We have commented on the allocation of CAPEX by output measures under table G6. A more robust allocation based on an analysis of project scope and expenditure would be needed to provide more reliable allocations.

Comments by line

Line 1	The base operating expenditure does not reconcile to the total operating expenditure reported in tables E1 and E2.

Comments by confidence grade

The company generally reports a B3 confidence grade for expenditure by individual quality drivers. Given the equal allocation of expenditure between drivers on individual projects, we suggest a B4 confidence grade for the report year. Given the limited extent of detailed development of the programme at this stage, we suggest a C4 confidence grade for expenditure in future years.

8.5 Tables G5 – Q&S2 Project Analysis – Actual and Forecast

Commentary by REPORTER

Introduction

Key points

- Table G5 covers the completion of the Q&S2 programme.
- Based on a sample audit of on-going projects and sub-programmes we concluded that there continues to be significant uncertainty regarding the cost and programme completion of the projects carried over from Q&S2.
- In the 2006-07 Q4 CIR Scottish Water reflected some of this uncertainty with an adjustment which moves projected expenditure in 2007-08 back to subsequent years. This adjustment is not included in the table G5.
- We have been able to reconcile the total expenditure, the phasing of expenditure and the allocation of expenditure by drivers between table G5 and tables G1 to G3.
- Table G5 records a negative adjustment of the SWS share account of -24.03 million to reflect the current assessment of the outcome of the Q&S2 programme. This is allocated between the four areas of capital maintenance only and is the cause of the major negative values 2006-07 for limited lines of tables G3a and G3b.
- The Q&S2 expenditure profile does not allow for future work expected on improvement to the continuous discharges to Loch Ryan following decisions by SEPA regarding requirements for discharges to shellfish waters.
- Scottish Water continues to report future expenditure of £10.76 million against programme risk for the water and wastewater programmes. This risk fund makes provision for some of the risks identified in the audit of individual projects described below.
- Grants and contributions reported in table G5 are the total grants and contributions the company expects to receive on the Q&S2 programme. An allowance has been made against the risk that some of the expected grants and contributions will not materialise.

Methodology

Table G5 reports expenditure on the completion of the Q&S2 programme. The structure of the table has been amended from previous years to follow the structure of table C of the final business plan and table K56 of the 2005-06 annual return.

- Scottish Water provides a detailed description of the content of each column in its commentary on the table.

The key source of data for the projects reports in table G5 is Scottish Water's Capital Investment Management System (CIMS). This includes:

- Actual expenditure information. Actual expenditure is imported into CIMS on a daily basis from the Project Ledgers.
- Future expenditure profiles. Future expenditure profiles are initially entered and updated by the Capital Investment Team. Once a project is allocated to a project manager, the project manager updates the data on CIMS including the capital expenditure profile. Information provided by Scottish Water Solutions is used to update projects undertaken or managed by Scottish Water Solutions.
- Purpose codes and output measures reported in table G5 are taken from Scottish Water's CAPEX approvals system.
- Actual or forecast milestones dates, particularly the CAPEX approval dates taken from the Scottish Water capital approvals system.

- Based on our audit and our experience of previous from previous audits of the capital programme we have concluded that Scottish Water provides robust reports on project data and accurately carries this data into the Annual Returns. Based on our audits, we noted a number of areas of uncertainty where the company has made judgement for the current project report based on a potential range of outcomes. We also noted that some projects had developed and the current view of the project was materially different from that captured at year end.

Comparisons with other submissions

The overall expenditure profile reported in table G5 is summarised in the table below where it is compared with the total expenditure in table G1 and G2

Comparison of G5 with tables G1 and G2

	2006-07	2007-08	2008-09	2009-10
Table G1 (Q&S2)	77.728	27.617	2.277	3.334
Table G2 (Q&S2)	95.347	53.186	32.962	7.017
Table G1 & G2 (Q&S2)	173.075	80.803	35.239	10.351
Table G5	173.076	80.803	35.239	10.649
Difference (G5-G1&G2)	-0.001	0.000	0.000	0.298

The difference in 2009/10 is due to table G2 line 2, column 40a where the correct value should read 0.033.

Comparison of Q&S2 programme (table G5) with the CIR

	2006-07	2007-08	2008-09	2009-10	Post 09/10
Table G5 expenditure profile	173.076	80.803	35.239	10.649	-0.117
CIR expenditure profile	173.076	58.768	55.239	12.684	0.000
Difference CIR – table G5	0.000	-22.035	20.000	2.035	0.117

The CIR for the completion of Q&S2 contains an adjustment line reflecting the opinion of Scottish Water management on overall future progress of the completion programme. The adjustment reflects an overview of programme risks which might not be accounted for in individual project assessments. It allows for delay of £22 million currently included in project budgets for 2007-08.

We have also compared the on-going projects on table G5 with a copy of WIC18 programme version V6 provided by Scottish Water. We noted that the project continues to be subject to disaggregation of the maintenance programme including disagregation of work on DSEAR compliance.

Q&S2 Project Audits

The reporting requirements ask the reporter to undertake audits of a range of projects. A brief description and key issues identified for each audit are summarised below. From these audits we concluded that there continue to be significant risks to the progress and outturn costs of Q&S2 completion projects. The remaining projects are generally projects which have been subject to some delay relating to a key issue such as the required consent or scope of works or by 3rd party issues such as land acquisition or planning permission.

Bowmore ST Facilities (1233)

Bowmore Septic Tank is an UWWTD project providing first-time treatment for protection of coastal waters. An undertaking has been agreed with WIC and SEPA covering late delivery of this and other UWWTD projects. Difficulties in obtaining land caused delay but these have been resolved. Treatment will be provided by a facultative lagoon, which also provides a solution for sludge treatment for the whole of the island of Islay. This aspect of the project is on track for a construction start in line with table G5. A key risk to the project is the resolution of treatment processes for metals discharged in trade effluent. Consent levels for metals and the required treatment processes have yet to be finalised. There is potential for delay to the project and further cost increases over and above that reported in table G5 as this issue is resolved.

Dunoon Sewerage (1243)

Dunoon Sewerage is an UWWTD project for first-time treatment and protection of recreational coastal waters. An undertaking has been agreed with WIC and SEPA covering late delivery of this and other UWWTD projects. Following agglomeration

of two small additional settlements into the project the increased total population resulted in a change of treatment requirements from primary only to secondary treatment. Modelling required to confirm consent requirements is yet to be completed and it is possible that long sea outfalls may be needed to meet water quality targets. Planning permission for the WWTW site is subject to a planning appeal. There is some uncertainty over the amount of growth to be catered for. As a result there is a significant risk of both delay and a risk of further increase in outturn cost as the discharge locations and outfalls are finalised.

Campbeltown Sewer Flooding (8806)

Campbeltown sewer flooding is a Q&S2 project, to resolve frequent sewer flooding of properties (now ameliorated by temporary measures) and unsatisfactory sewage overflows. The original project has been significantly increased in scope due to reclassification of the receiving water and response to local consultation. Costs are currently being re-estimated and there is a risk of further increase. Project start is delayed pending resolution of the scope and value of the project.

Invergordon WWTW (3300)

Invergordon is an UWWTD project for first-time treatment for protection of coastal waters. An undertaking has been agreed with WIC and SEPA covering late delivery of this and other UWWTD projects. The project has continued to develop. Additional growth and sludge treatment is being considered and might increase the project scope beyond that covered in table G5. The current proposals were rejected on planning appeal and further delay is expected while alternative proposals are developed. As a result, it is unlikely that the expenditure profile and delivery date in table G5 will be achieved.

Barclye and Palnure WTW (10121)

The original project was to upgrade two WTWs to meet standards on THM, colour, iron and aluminium. However, investigation showed that current water sources could not deliver the required yields. The proposed project now consists of a long linking pipeline connecting to the Penwhirn WSZ at New Glenluce. This revised proposal will result in a reduction in operating cost, although this is not reflected in Table G5. Capital costs will rise significantly above the figure reported in Table G5, both in 2007/8 and in total. Completion by the reported date of March 2008 may not be achievable due to complex consultation issues required.

Mains Rehab Condition grade 5 Unallocated (6020) and ACIP Watermains Rehab Phase 2 (9040)

The residual expenditure reported on both projects are provisions against future financial liabilities including reinstatement and claims arising from work already done. These liabilities span many projects and in some cases might not arise for a long time. Retaining the liabilities in holding lines allows individual project to be closed. The figures reported in table G6 are management estimates of likely costs, but actual costs and timing are difficult to anticipate.

DMA Establishment (2527) and DMA Establishment SW-wide (8298)

These two projects are being managed as part of a programme for DMA establishment which also includes 33 Q&S3 projects with the same purpose. The programme target is to cover 96% of the Scottish population by the end of March 2008. Resources are in place and the recent run-rate of completions (from February to May 2007) indicates that this target and the corresponding Table G expenditure could be achieved.

NE Developer Services (9620)

Scottish Water reports on-going expenditure on NE Developer Services. We understand that this relates to payments to contractors who carried out connections of new properties in Q&S2. We understand that Scottish Water is working with WICS on processes for accounting for development receipts and costs in Q&S3. We suggest that provision is made for connection costs at the time the connections are made.

Loch Ryan continuous discharge improvements

WIC 18 contained projects with a total value of £14.4m (at June 2001 prices) for projects at four locations (Stranraer, Leswalt, Cairnryan and Kirkcolm) with discharges to Loch Ryan. This expenditure was intended to provide appropriate treatment to meet the requirements of UWWTD and shellfish waters compliance. Options were reviewed during the Q&S2 period and the chosen option was to collect Stranraer and Cairnryan flows at Lefnol Point for treatment and discharge to the loch, with separate local treatment at Leswalt and Kirkcolm. SEPA however did not determine consent applications having reviewed its requirements for discharges to the designated shellfish waters in Loch Ryan.

This situation was discussed at the Capital Monitoring Group (CMG, renamed Outputs Monitoring Group, OMG in Q&S3). This group includes representation from SEPA, Scottish Executive, Scottish Water, DWQR and WICS. The group directed that all of the projects in this group should be suspended and the remaining funding, after deduction of spending already made, should be placed in a holding fund, the Environmental Quality Projects Parking Lot (EQPPL, project number 10081), with the funding subsequently reallocated to substitute projects. A number of other projects have been similarly treated using a process managed by the CMG/OMG. A spreadsheet listing all of the suspended and substituted projects was reviewed during the audit. Funding has been taken out of the EQPPL to fund substitute projects agreed by CMG/OMG. During this process the Loch Ryan projects have been given the lowest priority and a sum of £4.5m (post-efficiency) now remains in the EQPPL to fund Loch Ryan projects.

The Loch Ryan Shellfish Improvements project (11527), is designed to discharge to the Irish Sea through a long outfall on the west coast outside Loch Ryan after collection of flows from the four sites and secondary treatment near Leswalt. The latest best estimate cost for this project is £21.1m. Scottish Water take the view that their responsibilities have been discharged by suspending the previous projects as agreed by CMG/OMG and intend to deal with the cost discrepancy between remaining funding and estimated project cost by logging up the additional cost.

8.6 Tables G6 – Q&S3 Project Analysis – Actual and Forecast

Commentary by REPORTER

Introduction

Key points

- Table G6 covers the Q&S3a programme.
- In the report year investment has focused on asset maintenance and management and general while Scottish Water developed sub-programmes of work and individual projects in the quality, enhanced service level and supply demand programmes.
- The CAPEX3 target dates in table G6 shows that a significant proportion of the current year spend must go through CAPEX3 in the summer of 2007 to deliver the projected expenditure of 2007-08 and secure on-going progress on the programme. Scottish Water has recognised this risk. It has established action plans with individual managers tasked to ensure that the programme is delivered. At present these Action Plans are focused on the delivery of CAPEX3 milestones. Progress is being monitoring is forward looking, considering the current status and risks to delivery of milestones to due for completion in the near future. Despite these measures, we continue to be concerned that the planned progress on this critical element of the programme will not be delivered. Progress on projects will be hindered by the normal delays and there will be pressure on particular types of resource through the holiday season. We conclude that this presents a substantial risk to the delivery of planned spend and outputs in 2007-08.
- Significant elements of the projected expenditure remains in sub-programme holding lines pending development of detailed proposals.

Methodology

Table G6 reports expenditure on the Q&S3a programme. The structure of the table has been amended from previous years to follow the structure of table C of the final business plans and table K56 of the 2005-06 annual return.

Scottish Water has provided a detailed description of the content of each column in its commentary in the table.

The sources of data for table G6 are described under Section 8.5above.

Based on our audit and our experience from previous audits of the capital programme we have concluded that Scottish Water provides robust reports on project data and accurately carries this data into the annual returns. Based on our individual project audits we noted that much of the Q&S3a programme remained in development at the end of the report year. At the time of our audit it was apparent that there may be significant changes to projects as they had developed and scope and estimates refined.

Comparisons with other submissions

The total expenditure in the tables is set out below and compared to that allocated in tables G1 and G2.

Comparison of table G6 with tables G1 and G2

	2006-07	2007-08	2008-09	2009-10
Table G1 (Q&S3)	129.332	353.881	410.225	402.612
Table G2 (Q&S3)	110.879	219.328	225.611	219.392
Table G1 & G2 (Q&S3)	240.211	573.209	635.837	622.004
Table G6	240.211	573.209	635.837	622.004
Difference (G6-G1&G3)	0.000	0.000	0.000	0.000

All expenditure on table G6 is carried forward to tables G1 and G2 for the relevant years. Tables G1 and G2 do not included the reported expenditure on the Q&S3 programme prior to 2006-07 and expenditure post 2009-10

Comparison of Q&S3 programme (table G6) with the CIR

	2006-07	2007-08	2008-09	2009-10	Post 09/10
Table G5 expenditure profile	240.211	573.209	635.837	622.004	80.653
CIR expenditure profile	240.211	573.209	635.837	622.004	80.653
Difference CIR – table G5	0.000	0.000	0.000	0.000	0.000

Consistency of table G6 with table K56 of the 2005-06 Annual Return.

Table K56 of the 2005-06 Annual Return sets out the baseline investment programme for 2006-10. It included investment for Q&S3a only, presented in the same format as table C of the final business plan and table G6 of the current annual return.

During our audit we compared the content of table G6 with table K56. There have been numerous additions and deletions due to the aggregation and disaggregation of projects.

There has been aggregation of project lines for capital maintenance expenditure and management and general expenditure into holding lines in table G6. Specific or area based projects are being generated from these holding lines and budget allocated as this occurs.

Budget holding lines have also been developed for the various quality programmes. At the same time, individual project lines from table K56 have been retained and their expenditure profile set to zero. As individual projects are approved and released for development, the approved budget is transferred to the individual project line and the holding line budget

revised accordingly. The holding line budget may be adjusted to reflect Scottish Water's view of the overall programme. Actual expenditure is recorded against the individual project lines.

We have not identified any specific quality projects in table K56 which have not been retained in table G6.

Overall we were concerned that we had not been able to establish a clear approach to inflation in the various sub-programmes, in particular the calculation of spend in the various programme holding lines

Allocation by project driver

Much of the asset maintenance programme is managed as individual sub-programmes of work which target one of the four areas of infrastructure or non-infrastructure and water and wastewater. As a result, 100% allocation by driver is appropriate. In other cases, for example asset intelligence, property or health safety, the allocations are made as either a nominal 25% to each of the four areas or 50% to two areas depending on the type of work being undertaken.

Where asset maintenance is carried out as part of a quality project, an allocation to maintenance is made. In most cases, this is based on the project allocation made in the business plan and carried into table K56. In a limited number of cases, for example Edinburgh Water Treatment Works (31851), change in the allocation to asset maintenance has been made based on current understanding of scope and budget for the project. For other projects, the remaining allocation after asset maintenance is generally divided equally between the relevant quality and other drivers. We understand that Scottish Water and WICS are considering whether and how more specific cost allocations could be made.

For a small number of projects the project allocation by driver does not appear in table G6. As a result, it is not possible to fully reconcile tables G1 to G4 with table G6 on the information presented. We have confirmed that all expenditure in table G6 is reported in tables G1 and G2. We have confirmed that the allocation of expenditure by driver in tables G4a and G4b is substantially equivalent to the driver allocation in Table G6

The Q&S3 risk holding line (line 40020 estimated spend of £78 million) is allocated across the four areas of asset maintenance programmes. We expect that risks will also materialise on the quality, enhanced service and supply demand balance programmes.

Risk management funds

In table K56, Scottish Water introduced two risk management funds:

Autocode 31913 – "Rolled up line for Red1 and Green2 projects" which provided a risk reserve on the water quality programme to address issues arising on works where the agreement between Scottish Water and DWQR does not require a robust capital scheme to deliver the outputs.

Auto codes 999994 and 999995 – "Q&S3 risk management fund" which provided a reserve against unforeseen circumstances within the programme.

The line entries are retained in table G6 but the expenditure profiles have been set to zero.

A new risk holding line has been created as "40020 Q&SIII Risk Management Fund Holding Code" with expenditure of £78 million. Most expenditure has been allocated to 2009-10 and an allowance made for expenditure post 2009-10.

Q&S3 overhang

Scottish Water is projecting an overhang of expenditure on the Q&S3a programme for £80. This consists of:

Three specific water treatment works projects at Edinburgh, Blackpark and Turret where either the scale of the project or early difficulties in agreeing project scope indicate specific delays.

Three major programme holding codes for UIDs, water quality and wastewater quality programmes. The overhang is a judgement by Scottish Water that some projects on these programmes are likely to overrun into Q&S3. Given the nature of the projects in these programmes of work and experience of similar projects in Q&S2, it is reasonable to assume that some delay might occur.

The water infrastructure maintenance programme and the customer request lead pipe replacement programme. We understand that this is an error which will be corrected in later submissions. Scottish Water will respond to demand for lead pipe replacement as it occurs with expenditure reported in line with work done.

A significant part of the estimated overhang remains within the holding lines. It is based on judgement and particular issues have not yet been identified which would allow the company to make a more robust assessment of overhang. There is a risk of significant movement on this estimate as the programme develops and specific issues are identified.

Q&S3 Project Audits

The reporting requirements ask the reporter to undertake audits of a range of projects. A brief project description and key issues identified for each audit are summarised below. These audits presented a mixed picture with some projects proceeding to plan and some subject to risks of delay and further cost increases.

<u>Daldowie STW – Upgrade (30183)</u>

Proposed improvements at Daldowie STW consist of an upgrade to the inlet works to allow the full consented flow to pass through the works. Scottish Water has determined that the remainder of the works has adequate capacity to meet the consent. The project also includes some discretionary capital maintenance. Required external permissions have been obtained. The installation is complex due to the need to

maintain flows, but there is reasonable confidence in achieving the programme within the approved cost.

WOA000266 – Milngavie WOA – Removal of Cross-connections (35091)

The project forms part of a programme to remove widespread cross-connections between water mains and sewers, installed to allow washout of the mains. The initial high-level estimate of the number of cross-connections was 1750. Surveys to confirm the actual number are scheduled to be completed during July 2007 and it now appears that something in the region of 1000 cross-connections will actually need to be removed. Early work on removal has focussed on the more straightforward examples and so a reliable unit cost per connection removed cannot yet be estimated for the whole project content. There is reasonable confidence in completion of the project by the forecast date of June 2008. In view of the current uncertainties surrounding numbers and unit costs it is possible that the overall project cost will reduce compared to the currently reported in table G6.

Dalmacoulter 2a WSZ (33212)

The project covers 32 kilometres of mains rehabilitation in Coatbridge, Ayrshire. The project was begun under the Early Start programme, following PPRA carried out in Q&S2. Construction began in July 2006 and to April 13 km had been completed. There is good confidence in completing the work by the table G6 date of May 2008 and within the reported outturn cost.

Glenfarg WTW Upgrade (30307)

The project consists of a WTW upgrading to meet requirements for coliforms and turbidity, cryptosporidium and disinfection, plus some capital maintenance. The project manager's latest best estimates of capital and operating cost and completion date correspond closely with the Table G figures and there is good confidence in their achievement.

Blackpark WTW Upgrade (30095)

This project originally consisted of treatment improvements to meet standards for coliforms, disinfection and the birds and habitat directive at the Blackpark site. On investigation, yields from the current source proved inadequate, so a revised project was put forward for a new WTW on an alternative site, drawing water from the R. Spey, either directly or through river gravels. An adequate source has not been identified yet. Once a source is confirmed, land purchase and planning will be required. As a result there is a significant risk that the Table G6 completion date of March 2010 will not be achieved, with project expenditure continuing after the completion of the Q&S3a period. However due to increased investigation costs, the forecast Table G6 figure for 2007/8 expenditure is likely to be exceeded.

Troqueer WWTW – Odour Control (35463)

The project consists of odour control elements for the sludge handling plant at the main WWTW for Dumfries. This project was recently split off from the project for other improvements at Troqueer. The project will include measures to reduce the

production of odours, enclose the sludge-loading area in a new building, extract and treat odorous air. The odour treatment process has not yet been finalised and requires to be signed off by the Scottish Odour Steering Group (SOSG), which includes representatives from Scottish Water, The Scottish Executive and SEPA. The estimated overall cost appears robust but the forecast completion date of December 2008 appears challenging and some slippage of expenditure is likely from 2007/8 to 2008/9. The revenue impact of the project has not yet been assessed.

Environmental FTP Wastewater – Balvicar, Isle of Seil (31999)

This project is for the first-time provision of sewerage and sewage treatment on the Isle of Seil to provide environmental protection to shellfish waters. There is good confidence in meeting the programmed completion date. However the scope and cost of the project has increased through the design stage. This appears to result partly from improved cost estimating and partly from pressure from SEPA to increase the number of properties served. It was originally proposed to connect foul flows only, leaving surface water flows to be separated and follow the current drainage route to the sea. However, at the request of SEPA, it is now proposed to connect direct to septic tank inlets, resulting in an increased length of house connection and the connection of combined flows. As a result of these changes, project costs are likely to significantly exceed the figures reported in table G6.

Q&S3 sub-programme audits

During our audits of the Q&S3 programme we carried out reviews of individual sub-programmes of work to obtain and overview of the management and progress of the programme and to understand how sub-programmes of work were represented in table G6. From these audits we concluded the following:

- The asset maintenance programmes were likely to deliver the planned levels of investment. The sub-programmes had been divided down into strands to address particular serviceability issues or groups of assets. Particular target areas had been identified either by analysis of failures to identify hot-spot areas or by more detailed impact and risk analysis to prioritise maintenance of non-infrastructure assets. The sub-programmes are subject to action plans to manage and monitor progress through the CAPEX approval stages. This is supported by weekly Scottish Water approvals meetings to ensure that projects can receive approval quickly and that any issues delaying a project can be resolved.

- We reviewed the management and progress on the strategic studies on the UID programme. We noted the structured approach to the management of the strategic studies both technically and in terms of programme management. Much of the projected expenditure on the UID programme remains in a holding line. Where projects have been defined and released to delivery teams, the individual projects budgets are included against project lines and the budget netted off the holding lines.

- For the UID programme, we note that the table K56 programme cost inflated to money of the day prices is £178 million. The current projected spend for the

overall programme is £156 million. We understand that the UID strategic studies indicate that costs will exceed the budget. However, until the work has been agreed with the regulators and reasonable certainity of the complete budget confirmed, the company has opted not to report changes to date.

- The water quality programme is based on an agreement between Scottish Water and the DWQR on the compliance risk and the need for a capital investment solution. The understanding of scope of works has continued to develop as investigations of assets are carried out. In some cases the company has claimed outputs following investigations works only (Balmore WTW). In other cases reviews to the water resource and quality drivers has resulted in major revisions to projects which are likely to result in delay and increased costs (see Blackpark WTW Upgrade above). There has been a slow start to project delivery as Scottish Water reviewed the overall programme to integrate its approach to water quality, abstraction licences, growth and asset maintenance. The programme is now subject to an action plan with managers tasked to manage and monitor progress through CAPEX3 approvals. Where appropriate, the quality element of the project is being separated from other drivers to allow them to proceed. Where there is an obvious standard process solution, the CAPEX 2 and 3 stages are being integrated to ensure project approval at an earlier stage. Where necessary, individual review meetings are held on projects which fall behind expected progress to understand and, where possible, work around any need for approval or additional assessment required to achieve CAPEX 3

- Progress on the wastewater quality programme (including the backlog programme) is being maintained. However, a significant part of the programme must progress through the CAPEX3 approvals stage over the summer of 2007. As with other programmes, an action plan is in place to manage and monitor the approval of schemes.

Q&S3 3rd Party Risk Review

3rd party issue affecting construction projects include planning permission, site acquisition, site access, power supplies, environmental constraints telemetry and street works. These types of 3rd party issues were a key cause of delay to scheme progress and completion in the Q&S2 programme.

During our audit of the capital programme we met with Scottish Water staff responsible for managing these issues in Q&S2. From these discussions we noted a co-ordinated approach to the management of 3rd party issues in the Q&S3 which drew on lessons learnt from delivery of the Q&SII programme.

We noted a structured approach to identifying and managing 3rd party risks. A central resource of specialists in planning, land access, land acquisition, environmental issues and power supplies has been established. Individual specialists are aligned with area teams and individual senior project managers to assist identify risks and ensure that they are managed centrally. Standard procedures are in place showing the key stages and sequence of actions required for key 3rd party issues. Pro-forma documents are available for the submission of documents.

In addition to ensuring that robust procedures are in place, risks identified are collated and reviewed monthly with the project teams. A database is maintained identify key risks and relevant project milestone dates, allow progress to be monitored. Relationships with key stakeholders are managed, drawing on the monitoring process to provide information on upcoming work. This allows particular issues to be addressed and allows Scottish Water and other stakeholders to plan and resource their work. Reports and key issues are reviewed by senior management within Scottish Water and Scottish Water Solutions as appropriate.

Based on our discussions and review of documentation, we formed the opinion that Scottish Water had learned from the experience of Q&S2. Sound procedures were in place to identify, address and manage 3rd party risks. This will significantly reduce the risk that delays will occur in Q&S3 due to 3rd party issues. However, by their nature, 3rd party risks cannot be fully controlled and it is likely that some projects will be delayed by 3rd party issues. This remains an asymmetrical risk where successful delivery of most of the programme will not balance out the impact of the limit number of risks which materialise.

Progress through CAPEX 3.

The progress of work and expenditure profiles in table G6 assumes that a significant part of the programme, and a significant of expenditure in 2007-08, will move through the CAPEX 3 in 2007-08. In particular, a significant part of the 2007-08 spend must pass through the CAPEX 3 approval stage during the summer of 2007. We are concerned that it will be difficult to maintain the required progress through the summer months and, as a result, there is a significant risk that the company will not be able to deliver the projected expenditure in 2007-08.

During our audits we noted that the company had recognised this risk and has put action plans in place for key components of its programme. Managers are tasked to drive and monitor sub-programmes of work through the CAPEX 3 stage to ensure that outputs are delivered in 2007-08.

Q&S3 CAPEX 5 Dates

In the Q&S2 programme CAPEX 5 dates indicated beneficial use. We understand that the Q&S3 CAPEX 5 dates are intended to signify quality regulator sign off for appropriate projects. In our audits were noted that the time allowed between beneficial use and quality regulator sign-off is often one month or less. We understand that the process is likely to take at least two months. We are concerned that as projects are developed CAPEX 5 dates will be pushed back as a better estimate of the time required for regulatory sign-off is included in the programmes. We recommend that this is reviewed so that overall programme completion dates are not subject to continuous creep which does not reflect any real delay in the beneficial delivery of outputs.

8.7 Table G7 – Q&S2 Output Delivery

Commentary by REPORTER

Introduction

Key points

- The company has reported delivery of outputs in lines 1 to 9 against beneficial use dates.
- The reported quality outputs in lines 1 to 9 are consistent with the progress on the Quality and Standards 2 sign off reported in lines 13 to 17.
- A number of outputs reported in lines 1 to 9 at beneficial use date were submitted for regulator sign off as early as 2005 but have not yet been signed off. Discussions are on-going to resolve these issues. In a few cases additional work may be required to allow the quality regulators to sign off the output.
- For the future, we suggest that progress on quality outputs should include a report on sign-off by the quality regulators.
- Scottish Water has worked to complete its records of water mains and sewers rehabilitation carried out in the early stages of Q&S2. As a result, there are differences between the current report of activity and the sum of data reported in previous annual returns. The reports include work carried out as part of planned rehabilitation programmes, reactive maintenance on bursts and collapse and work carried out as a consequence of other schemes.

Methodology

The company has reported progress on outputs by beneficial use date.

Q&S2 Sign off process

Procedures for regulatory sign off of projects with defined quality outputs have been developed by the DWQR, SEPA and Scottish Water since the last Annual Return. Output sign-off is recorded on Output Delivery Sign-off forms which are signed on behalf of Scottish Water and the appropriate regulator.

Scottish Water offer projects for regulatory sign off once it believes the regulated outputs have been achieved. Output delivery is identified and controlled within Scottish Water through completion of:

- a "Wastewater Regulatory Output Approval Form" for wastewater quality projects; and,
- a "Water Into Supply Certificate" for drinking water quality projects.

The relevant forms are prepared by the capital delivery team. They are reviewed and signed off as appropriate on behalf of Scottish Water by representatives of Strategy and Planning and Operations.

In addition to addressing on-going projects Scottish Water are working to address the backlog of projects completed before the regulatory sign-off procedure was initiated. These projects may not have all the paperwork recently introduced by Scottish Water to identify delivery of an output. In these circumstances, the Output Delivery Sign-off form is prepared on the basis of the project records and circulated to relevant staff in Strategy and Planning and Operations for confirmation that the output is complete before submission to the relevant regulator for sign-off.

Regulators have opted to provide sign-off on projects and all the associated drivers and outputs at one time. In some cases Scottish Water may achieve some outputs on a project in advance of others which are not recognised by the regulatory sign-off procedure until all the project outputs are delivered.

Regulatory sign-off is based on the completion of a reasonable set of assets likely to deliver the associated outputs in the long term. Long term monitoring of asset performance may expose weaknesses in the assets which would have to be corrected to secure the outputs.

Regulatory sign-off is based on the performance standards set for Scottish Water in pursuance of a particular output or driver. For example, regulatory sign-off may be based on consent compliance rather than river quality objective. It is possible that Regulators will impose more onerous consents on Scottish Water in pursuit of the same driver in the future which will require further investment in future Q&S periods.

We understand that the Q&SII drivers for wastewater treatment were not necessarily defined as works consents. It is then for the Regulator in discussion with Scottish Water to confirm that the Q&SII consent level applied is consistent with the output delivered.

In addition to a description of the improvements made, the Output Delivery Sign-off sheets include the:

- Purpose codes
- Output driver codes and quantity
- Output code and quantity

Scottish Water tracks the completion of outputs including internal sign-off and regulatory sign-off. Regular meetings are held with regulators to manage the process and address issues arising. A process is in place for escalating issues which cannot be resolved at an operational level. During our audit we were able to review the tracking system used by Scottish Water. It was possible to follow audit trails to supporting documentation including Scottish Water project sign-off and copies of the signed Output Delivery Sign-off forms. This sample audit indicated that the process was robust and accurate and record keeping was good. It was possible to confirm that the S12 status codes reported in the G Tables corresponded to Scottish Water's tracking records.

We understand that the Regulators are signing off projects on the basis that the assets provided are likely to provide secure performance against the appropriate driver in the long term. In some instances (say orthophosphate dosing for lead control in water distribution) it will take some time after the assets are operational to achieve the lead standard.

Comment by Line

Lines 1 and 7 – First time provision of water and sewerage services.

The reports on the first time provision of water and sewerage services are consistent with previous outputs reports in the G tables. This is an area of the programme where we have not carried out individual project audits to confirm the outputs.

Line 2 – Removal of properties from the poor pressure register

The company notes the number of properties removed from the poor pressure register to March 2006 as 1391, meeting the Q&S2 target of 1391. Based on the cumulative reports in Table B2 from 2002-03 to 2005-06, 1114 properties were removed from the at risk category due to asset improvement and 510 were removed due to operational improvement. The reported improvement due to company action was 1624, exceeding the target for Q&S2.

In previous audits we have commented on the poor quality of the information on the initial registers and this has been confirmed by both the significant movement in the register over time and the net reduction due to better information. The number of properties removed from the at risk register were the number included in the register at the start of Q&S2. Given the poor quality of the register at the start of Q&S2, it is possible that some of these properties were receiving adequate pressure before the improvements were made.

Lines 3, 5 and 9 Quality outputs

Quality outputs are reported for:

- Drinking water quality drivers.
- Continuous discharges
- Unsatisfactory CSOs.

The company has reported completion of outputs against beneficial use date. We have reviewed the report against the list of outputs in the Q&S2 sign-off process and found that the report is consistent with the sign off process reported in lines 13 to 17.

Because the report in lines 2, 5 and 9 is against beneficial use date it appears well in advance of the sign-off process. In addition it includes a

number of outputs which have been submitted for sign-off and which have not yet been signed off. In some cases, sign-off sheets were submitted to the regulator in 2005 have not been signed off pending agreement that the output has been achieved or, where necessary, further work to complete the output.

Line 4 and 8 – Rehabilitation of sewers and water mains

The company has continued to review its work on water mains rehabilitation to capture all work done and overcome some deficiencies in reports in the initial stages of the of Q&S2. As a result there are some differences in the quantity of sewers and water mains rehabilitated as reported in table G7 and the year on year reports on activities in the B tables, the C tables and the G tables.

The reported length of mains renewals includes work carried out as part of planned programmes of work based on condition and performance including mains work to improve water quality. It also includes reactive maintenance on burst repair and work carried out as a consequence of other schemes.

The reported length of sewer renovation includes work carried out as part of the planned critical and non critical sewer maintenance. It also includes reactive maintenance on collapse and work carried out as a consequence of other schemes.

Line 7 – Removal of properties from the at risk flooding register

The company reports 728 properties removed from the at risk registers up to March 2006 and a further 102 properties removed in 2006-07, just exceeding the target of 829 properties for Q&S2. In the four Annual Returns from 2002-03 to 2005-06, the company reported a total of 734 properties removed from the at risk registers due to company action. The total number removed in 2006-07 was 116. Based on our previous audits we consider the company's report to be reasonable. For some named schemes in the WIC 18 programme, the number of properties removed from the at risk registers on completion of a scheme was the number of properties on the at risk categories at the start of Q&S2,which formed the basis of the WIC 18 programme and outputs. A specific flooding report has not been recorded for some of these properties to confirm the at risk categorisation.

Lines 10 to 12 – WIC 16 progress

The company has provided a report on progress of the WIC 16 programme.

The programme has developed from an allocation of expenditure in the Q&S2 business plan. We understand from the company that a defined list of schemes was developed for first time provision of sewerage, provision of water supplies to schools, the relief of rural development

constraints and release of development constraints supported by Community Scotland. Scheme for the first time provision of sewerage and water were supported by SEPA and DWRQ respectively.

We understand that the agree programme includes 18 schemes for the first time provision of water, 10 schemes for the first time provision of sewerage and 33 schemes for the release of development constraints.

Schemes are reported as complete when they have reached beneficial use date (S10). The report in table G7 is consistent with table G5. In some cases the outputs were delivered following investigations which found that either the output had been delivered as a consequential output from another scheme or that the output was no longer required.

During our audit, Scottish Water provided information on the schemes included in the Q&S2 overhang. A review of an example scheme scheduled for delivery in 2007-08 gave reasonable confidence in the forecast delivery dates. Progress on each of the three schemes scheduled for completion in 2008-09 is affected by a third party issue. One scheme is affect by land issues and alternative proposals are being developed. As a result some abortive work has been carried out and further work will be required to prove the alternative resource. One scheme is dependent on addition water resource being developed as part of a Q&S3 scheme. In both these cases there are significant unresolved issues which leave completion dates uncertain.

Lines 13 to 17 – Progress with Quality and Standards 2 sign off

We reviewed the Q&S2 sign-off process in our audit of the 2005-06 Annual Return. Our comments on the methodology is set out above. During our audit we were able to confirm our initial views of the sign-off process was a rigorous and well managed process with robust cross checks by Scottish Water and the quality regulators. We suggest that consideration is given to moving future versions of the sign-off records to a database to overcome some of the potential weakness of spreadsheets as a secure source of data.

During our audit we were able to follow sample sign-off sheets to the main spreadsheet recording sign-off. As with last year, we were able to confirm the accuracy of the data.

We note that the reported number of projects submitted for sign-off by Scottish Water includes projects submitted on 4th April 2007. The number of projects recorded as submitted up to the 31 March 2007 was 974.

8.8 Table G8 – Q&S3 Ministerial Objectives and other outputs – Quality

Commentary by REPORTER

Introduction

Key points

- The delivery of Ministerial Objectives and other outputs – quality has met its targets for the first year of Q&S3a with minor exceptions. Outputs delivered reflects the slow start on quality outputs envisaged in the Delivery Plan while Scottish Water develops the detail of its programme of work.

- The provision of strategic capacity and water and wastewater treatment works is based on projects committed in the year as well as projects completed in the year.

- Scottish Water has maintained progress on the key studies required to define its future programme of work. Key milestones for completion of the detailed design and receipt of tenders on the UID programme have been moved back to allow sufficient time to develop detailed designs. This will place additional pressure on the construction phase and increases the risk that the construction complete at all UIDs in the Meadowhead and Stevenson catchments will overrun the forecast milestone. Scottish Water remains confident that the outputs will be achieved and is investigating procurement routes to achieve this.

Methodology

The company provided detailed lists of outputs which have reached beneficial completion in the report year. We recommend that this is maintained as a cumulative list for future years.

Comments by line

Line1 – Customer Service

Customer service outputs covers the number of wastewater treatment works where odour problem is addressed. The Q&S3 programme envisaged improvements at 35 works with work on 14 to be completed in the Q&S3 period.

The odour management programme is monitored through the Scottish Odour Steering Group. Work is being carried out under the statutory Code of Practice. The Code of Practice encourages a staged approach to improvements so that the impact of initial work can be monitored before committing to additional works which might have less benefit. We understand that this approach was considered as the business plan was finalised and that there is a reasonable understanding of the scope of work to be delivered in Q&S3a.

We understand that odour management plans have been completed and odour improvement plans have been submitted to SOSG. Scottish Water Solutions are developing the work identified in the odour improvement plan into detailed scopes of work.

One output is claimed for the report year following asset maintenance work at Dingwall WWTW.

It is possible that changes to sludge disposal strategy will significantly reduce the need for odour control at one named works. We understand that the company is considering bringing forward investment at another works until the uncertainty is resolved.

Given the stage of development and the type of work, we believe that the proposed targets are reasonable, subject to quick confirmation of the scope of works for projects to be completed in 2007-08.

Lines 2 to 11 – Water Quality

The company has identified improvements to 12 water treatment works in the report year. The company reports that for each works the disinfection system is investigated and upgraded as necessary as part of the overall quality scheme. The reported populations are those included in the business plan for the works.

Some works have been delivered at zero or minimal expenditure. This includes works such as Balmore Road where investigations have shown almost no investment was required to meet the standards agreed with the DWQR. In other cases the works have been mained out and closed on completion of a Q&S2 water mains scheme. By reporting the population served from the business plan, the company will ensure that the transfer of population served on works closure will not be double counted as other improvement works are undertaken.

The company reports that there have been no recorded customer requests for lead pipe replacement in the report year. It notes the need to review its methodology to ensure that requests and resulting works are accurately recorded for future years.

For the remaining water quality outputs, the company provided detailed lists identifying the outputs achieved in the year. These were not subject to audit.

Lines 12 to 17 – Waste-water Quality

The company has identified 25 UIDs improved in the report year consisting of 13 dual manholes and 12 named UIDs.

The named UIDs have generally been delivered at zero or minimal cost. These are UIDs named in the original programme where detailed investigation has demonstrated that the performance of the intermittent discharge does not need to be improved and no further investment will be required. It is possible that the

detrimental impact on the receiving water attributed to the discharge will be resolved by work on another discharge which may or may not have been named as an unsatisfactory discharge in the business plan programme.

The company has developed its programme of work to close landfill sites. Work at two sites has been completed and agreed with SEPA. Current estimates of the work required indicates that expenditure will exceed that envisaged in the final determination.

Lines 18 to 23 – Development Constraints

The reported provision of strategic capacity at wastewater treatment works is based on proposed additional capacity at a list of named treatment works. The development constraint is released once the scheme is released for assessment of options (CAPEX1). The schemes included in the return have completion dates up to June 2008.

The reported provision of strategic capacity at water treatment works is based on the proposed additional capacity at a list of named treatment works. Much of the strategic capacity included in the report year is based on leakage reduction releasing existing distribution input capacity for consumption. Some schemes included in the list have yet to reach CAPEX1 and completion dates are not given.

The number of connected properties in the report year is taken from table A1 line 11 (properties connected to the water service).

The implied change in the customer based reported in line 21 is the difference of lines 22 and 20.

The net increase in billed properties in Line 22 is calculated from the difference between WIC4 2006 and 2007 for households receiving a water service plus an allowance for non-household properties connected.

The number of properties relieved from development constraints is the sum of the water and wastewater populations in lines 18 and 19 divided by 2.11 (the estimated average occupancy rate for 2010).

Line 24 – Introduction of Competition

The installation of meters for unmeasured non-household customers is slightly behind target with rate of installation expected to increase in 2007-08 and to be complete by the end of March 2009.

Lines 25 to 26 – Additional Capital Maintenance Allowance

Agreement has been reached between reached between Scottish Water and SEPA on the definition of this investment and work is underway.

Work is underway to agree a programme of work with DWQR.

Lines 27 to 29 – Leakage

We note the projected dates for delivery of the leakage outputs. The company has a plan in place to deliver these outputs. We have recently been involved in the Regulatory Leakage Group and see no reason why the delivery dates should not be met.

Lines 30 to 40- Water Resources Studies

We have not audited progress on the Water Resource Studies in the report year.

Lines 41 to 49 – UID Strategic Studies

During our audit we reviewed the processes adopted to complete the UID strategic studies and progress to date. We noted the well structured approach which has been developed, the detailed management of the programme of work and the commitment to achieve the output dates.

Four key dates have moved back from the original target dates as follows:

- Complete detailed design and receive tenders for work required in Portobello and Glasgow catchments (moved from 31/08 2007 to 31/05/2007).
- Identify and agree with SEPA the optimum solutions for Meadowhead and Stevenson catchments (moved from 30/09/2007 to 30/09/2008)
- Complete detailed design and receive tenders for work required in Meadowhead and Stevenson catchments (moved from 31/05/2008 to 31/08/2008).
- Construction complete at all UIDs in the Portobello catchment (moved from 30/09/2009 to 31/12/2009).

We believe that it is reasonable to allow further time for the completion of detailed designs and receipt of tenders. We understand that intermittent milestones are considered by the OMG to monitor progress towards these key milestones. We understand that 3rd party issues will also be progressed and resolved through the design stages and recommend that resolution of these issues including land acquisition, planning permission and environmental permissions should be complete before the design and tender stage is signed off.

We note that the additional time spent in design and tender will place additional pressure on the construction stage. Scottish Water has already rephased the outputs and increased the number of outputs it expects to deliver in 2009-10 as a result. However, we note that the milestone date for construction complete at all UIDs in the Meadowhead and Stevenson catchments remains 31/03/2010. Scottish Water notes that there is inevitably uncertainties in this forecast. Scottish Water is already projecting expenditure on the UID programme beyond this date. We conclude that there is a high probability that construction will not be complete on the Meadowhead and Stevenson catchments by 31/03/2010. Scottish Water will be able improve its confidence in the completion date as the initial stages of the UID strategic studies are complete and the scope of works is better defined.

Lines 50 to 54 – Progress with Quality and Standards 3 sign off

We have reviewed the Q&S3 sign off procedure which is similar to that adopted for Q&S2. To date, only a limited number of outputs have been offered the quality regulators at the end of the report year and only one output had been signed off.

8.9 Table G9 – Q&S3 Ministerial Objectives - Serviceability

Commentary by REPORTER

Introduction

Key points

- The reported data draws from other sections of the annual return or data reported by the quality regulators.
- In some cases reported actual performance is significantly better than the target. These stepped changes can be due to better quality information as well as company action.
- Initial experience of new reporting requirements for pollution incidents indicates that they may result in a stepped increase in the number of incidents reported. As experience develops, we recommend that consideration is given to revising the target levels to reflect the new definition.
- The report indicates that all target will be met by March 2010. The expenditure reports now indicate an overhang of expenditure beyond March 2010 which might result in some delay to delivery of outputs necessary to meet the serviceability targets.

Methodology

The reported data draws from other sections of the annual return or data reported by the quality regulators. Where necessary, we have commented on the methodology against the individual lines below.

In general, the company has reported the Delivery Plan target values as the forecast values for 2008, 2009 and 2010. The exception is the number of unsatisfactory intermittent discharges (see comments on line 10 below). In some cases reported actual performance is already significantly better than these forecast levels.

The reported serviceability performance assumes that targets will be met by March 2010. The expenditure programme already includes an overhang beyond 2009/10. Some of this overhang relates to key quality programmes of water quality, wastewater quality and UIDs which have a bearing on the delivery of serviceability indicators. It is not possible to confirm that the necessary outputs will be achieved by March 2010 and that the residual spend will relate to completion of associated assets and facilities such as roads and building which will not affect the outputs in the short term.

Comments by line

Line 1 Performance is reported for the 2006 calendar year. The reported actual for March 2007 reconciles to the Annual Water Quality Report for 2006. Performance is marginally ahead of target.

Line 2 Performance is reported for the 2006 calendar year. The reported actual for March 2007 reconciles to the Annual Water Quality Report for 2006. Performance is marginally ahead of target.

Line 3 Performance is reported for the 2006 calendar year. The reported actual for March 2007 reconciles to the Annual Water Quality Report for 2006. Performance is ahead of target.

Line 4 Reported performance reconciles to table B2 line 9. Reported performance of 7,772 is well ahead of the target of 12,732. This is due to a more robust review of properties at risk which resulted in a net 5049 properties removed from the risk register due to improved information. At present, there is no reason to believe that performance should revert to the higher target levels in future years.

Line 5 Reported performance reconciles to table B2, sum of line 17 and 24 (unplanned interruptions and overruns of planned interruptions). Reported performance of 4,810 is well ahead of target of 16,141. This is due to additional focus on this performance measure, in part to meet OPA targets. At present, there is no reason to believe that performance should revert to the higher target levels in future years.

Line 6 Reported performance reconciles to table B8 line 1. Performance is ahead of target.

Line 7 Reported performance reconciles to table B3 line 13 and 14 (2 in 10 and 1 in 10 at risk properties). Reported performance of 1,042 is well ahead of the target of 1,603. The apparent stepped change in performance is due to the completion of a review of clusters of properties at risk of flooding. This exercise did not identify the level of unreported properties included in calculation of the business plan targets. In addition, there appears to be a lower level of properties reporting flooding for the first time than was assumed in the business plan targets although significant variation should be expected in these numbers year on year. At present, there is no reason to believe that performance should revert to the higher target levels in future years.

Line 8 The number of properties internally flooded due to other causes includes flooding incidents caused by lateral sewers which are the responsibility of Scottish Water. This approach is consistent with the targets. The equivalent report in table B3 line 6 (475) reports flooding incidents attributed to the main sewer only for consistency with reported figures in England and Wales. Reported performance of 1319 is well ahead of the target figure of 3438. The target was based on an assessment of a small sample of data in 2005-06. The company has done further work to improve the identification of property flooding and flooding caused by private sewers. This has resulted in a significant reduction in the reported numbers. It is likely that numbers will continue to vary year on year as the data arising from the new systems of reporting and reviewed.

Line 9 The number of failing wastewater treatment works is the number of works failing at the end of the 2006 calendar year based on the regulatory monitoring carried out by SEPA. It includes PPP treatment works. The reported number of 48 is slightly over target of 45. The number of failing works will, in part, reflect external circumstances such as weather conditions and trade effluent discharges in the year and some variation around the target should be expected year on year.

Line 10 The company has reviewed the number of unsatisfactory intermittent discharges in the report year and restated the baseline position for March 2006. The original target was based on a reduction of 277 UIDs over Q&S3. The revised target is based on addressing 315 UID's over Q&S3, 38 more than planned. The number of outputs to be delivered in the final year of Q&S3 has increased from 128 to 171 to reflect the revised milestone dates for completion of design and receipt of tenders.

We expect that there will be some movement of named outputs in the UID programme. Investigations may show that no work will be required at some UIDs named in the original programme. Work will be required at some UIDs not named in the original programme. We recommend that consideration is given to how these changes are reflected in the serviceability targets.

Line 11 The number of pollution incidents continue to be reported against internal standards used by Scottish Water. The company and SEPA have developed new reporting standards consistent with England and Wales which were introduced from January 2007. Early indications are that the new standards will cause a stepped change in the number of reported incidents. Consideration should be given to adjusting the target to reflect the new reporting standards.

Comments by confidence grade

We have commented on the confidence grade for current report year figures which are included in this table.

We do not believe that the confidence grades for forecasts in lines 3, 4, 5, 6, 7, 7, 8 and 11 are appropriate given the current year figures and the introduction of new reporting requirements for pollution incidents.

9. SECTION H: ASSET INVENTORY

9.1 Overview

9.1.1 General overview

Scottish Water has made a complete return of its current asset inventory in Tables H1 to H6.

In the report year Scottish Water has continued to make changes to its asset inventory to account for investment, data cleansing and data improvements mainly associated with the condition and performance grading of infrastructure assets. A large number of asset surveys have also been carried out, resulting in updating of asset information covering:

81	Water treatment works
252	Secondary disinfection installations
641	Clean water pumping installations
1576	Service reservoirs and water towers
1839	Sewage pumping stations
836	Wastewater treatment works
21	Sludge treatment centres

Sites were graded for condition, performance and health and safety issues using grading pro-formae based on the WRc methodology.

The overall EARC valuation has increased from £28.226 billion in 2004-05 to £30.463 billion in 2006-07, an increase of 7.9% including inflation. Over the same period COPI indices have increased from 151 to 158, an increase of 4.6%.

Scottish Water has updated the asset valuation using the cost functions used to prepare the 2004-05 valuation updated for inflation by the COPI index.

The asset valuation has been prepared on the basis of an EARC asset valuation which follows the same procedures and uses the same cost data as in previous years. Scottish Water expects to be able to report on the basis of an MEAV asset valuation from AR 08 onwards. The EARC valuation still relies in part on:

- Incomplete asset information which has been extended by assumption or extrapolation;
- Valuation of a much improved but still limited samples of assets;
- Some cost functions which rely on old data or other company data and for which a clear audit trail is not available.

Scottish Water has generally retained the confidence grades of the asset valuations at those previously reported. We comment further in the individual table commentaries.

We again note that Scottish Water's predictive model for water mains condition grading indicates a significantly poorer condition than that derived from reported burst frequency. We believe that further work is required to reconcile the predictive model with burst frequency.

Scottish Water is undertaking a significant programme of mains investigation and renovation based on its knowledge of condition and performance of its water mains. We recommend that the results of this renovation programme are used to validate the current assessment of condition and performance grade reported in the asset inventory.

For the report year the company was not required to allocated asset valuation by risk and financial impact grades. The company has continued to use the Information Requirement H Appendix 6 included in previous reporting requirements to allocated EARC values by replacement periods. We note that this assessment indicates that investment is required in assets with an EARC value of £1140 million each year over the next ten years. The model also indicates that investment is required in assets with an EARC value of £2862 million for each of the next two years. We do not believe that this assessment, which relies on a series of assumptions built into the analysis, is a credible assessment. These figures are a consequence of:

- key assumptions made by Scottish Water when undertaking the analysis; and,
- the structure of the analysis itself which makes simplifying assumptions to address a complex issue.

We are not convinced that the current assessment of replacement periods reported in the return provides information which is of real value to either Scottish Water or the WIC.

The reporting requirements ask the Reporter to comment on specific issues. Separate sub-sections cover the following issues:

- Consistency of Scottish Water's asset inventory with previous submissions.
- Change to condition and performance assessment.
- Guidelines on condition and performance grading.
- Allocation of EARC by a condition performance matrix
- Commentary relating to asset "serviceability"
- Reporting asset inventory for Support Services on a water/wastewater basis
- Overall judgement on the suitability of EARC valuations

9.1.2 Consistency of Scottish Water's asset inventory with previous submissions.

The guidance to Reporters in Information Requirement H notes that:

The Reporters should assess the consistency of Scottish Water's asset inventory with previous submissions and how the necessary data capture and storage is implemented across its business. Specifically, the Reporters should check that Scottish Water has provided clear reasons for any significant fluctuations in the total gross equivalent asset replacement cost MEAV, and the split of this total by both condition and performance gradings.

For the report year Scottish Water has updated the asset inventory to take account of:

- Investment delivered in the report year.
- Corrections of errors and omissions identified by users of the asset inventory information.
- Routine improvement of asset data
- Significant numbers of asset surveys
- Changes to the definition of "types" of water treatment works which is also a key parameter in the methodology adopted to value the assets.

The assets were valued using the cost functions developed for the 2003-04 valuation updated for inflation using COPI indices of 142 in 2004-05 and 158 in 2006-07 giving an inflation factor of 11.3%.

On this basis the EARC valuations for the current and previous years at a 2004-05 cost base are:

2002-03 Valuation	£35.85 billion
2003-04 Valuation	£28.121 billion
2004-05 Valuation	£28.226 billion
2005-06 Valuation	£28.839 billion
2006-07 Valuation	£27.346 billion

9.1.3 Change to Condition and Performance Assessment

The guidance to Reporters in Information Requirement H notes that:

With regard to condition and performance assessments, the Reporters should comment on any apparent improvement or deterioration within the various asset groups, and how these may relate to the assets' useful lives or programmes of maintenance or replacement. The Reporters should also note changes to the associated confidence grades, both in terms of accuracy and reliability, and examine the reasons attached to any movement in these assessments themselves

There are movements between performance and condition grades within individual asset groups.

We believe that the movements in condition and performance grade are due to data cleansing via the significant additional surveys carried out this year, additional data or changed methodology. We have not identified any indication of significant improvement or deterioration in the underlying asset base.

9.1.4 Guidelines on condition and performance grading.

The guidance to Reporters in Information Requirement H notes that:

The Reporters should ensure that Scottish Water is using the appropriate definitions and guidelines in assigning condition and performance grades on the established '1-5' scales. Scottish Water should have sufficient processes in place to ensure consistency of assessment across its business and asset base, and to limit the subjectivity of judgments

During the audit we have noted that Scottish Water has applied detailed interpretation of the WICS definition of the performance and condition grading grades. Where appropriate, we have commented on particular interpretations in the individual Table reports. We have particular concerns about the interpretation of the definitions for:

- Water mains condition grade where the results of a predictive model are significantly different from the condition grade assessed from burst frequency.

For other small groups of sub-assets, specific surveys of condition and performance grade have not been undertaken and age has been used to determine condition and performance grade. These assessments may change significantly as specific surveys are undertaken and performance data assessed.

From the sample audits undertaken we believe that Scottish Water has in place sufficient processes to ensure consistency of assessment across its business and asset base which will limit the subjectivity of judgements.

9.1.5 Allocation of EARC by a condition performance matrix.

The guidance to Reporters in Information Requirement H notes that:

The Reporters should note any assertion from Scottish Water as to the relationship between the condition and performance assessments for any given asset group. For example, performance may, to some extent, be interpreted as a function of asset condition and operational policy. The Reporters should explore the potential for reporting a breakdown of the MEAV for each asset group in a 5x5 'matrix' of condition against performance, such that there is no overlap between the two assessments as reported at present.

We have not identified any specific assertion by Scottish Water as to the relationship between the condition and performance assessment for any given asset group.

We understand that previous reports from Scottish Water have commented on the overall relationship between condition and performance grade. We accept that a true assessment of condition and performance grade can only be assessed on a 5x5 matrix. However, we are not convinced reporting annually on the basis of a 5x5 matrix of condition and performance grade for individual assets will provide a significant benefit to Scottish Water or to the WICS.

9.1.6 Commentary relating to asset "serviceability"

The guidance to Reporters in Information Requirement H notes that:

The Reporters should highlight any commentary relating to asset 'serviceability' and Scottish Water's assessment of the capacity of asset groups to fulfil their specified role regardless of relative condition or performance.

We have not identified any general comments relating to asset serviceability in the Annual Return.

9.1.7 Changes in the proportion of redundant and decommissioned assets

The guidance to Reporters in Information Requirement H notes that:

The Reporter should comment on any observed change in the proportion of redundant and decommissioned assets, and how these contribute to Scottish Water's overall valuations.

As a result of Scottish Water's reassessment of its asset valuation:

- The value of reported redundant assets has increased from £1903 million in 2005-06 to £1909 million, an increase of £6 million.
- The value of reported decommissioned assets has increased from £146 million in 2005-06 to £210 million in 2005-06, an increase of £64 million.

9.1.8 Reporting Asset Inventory for Support Services

The guidance to Reporters in Information Requirement H notes that:

The Reporters are asked to consider the potential for reporting the asset inventory for Support Services on a water/wastewater basis. The Reporters should seek to establish the code changes needed to facilitate such a split under the existing reporting mechanism.

From our work elsewhere we are aware that many companies allocate values of support services simplistically, either on a 50/50 split or on the basis of staff employed. We do not think that such splits add much to a general understanding but acknowledge that it may be needed for comparative purposes based on current practice. In our view support services can best be compared with other water and wastewater companies as a stand alone item.

In terms of Scottish Water we believe that the code changes required to facilitate the split are simple. The introduction of a matching set of asset codes for water and wastewater with separate tables for each service area would be sufficient.

A significant proportion of the support services assets reported in Table H6 are to support both water and wastewater services. If support service assets are to be reported on a water and wastewater basis some method of proportional allocation would be required. The confidence grade of the support assets allocated between service areas will be lower than the confidence grade for the asset inventory and valuation as a whole.

Due to the fact that many common assets are used to support both water and wastewater services we recommend that a clear need to split the data is determined before separation is introduced. Providing an explanation for the reason for the split would assist in ensuring that the methods and level of proportional allocation of common assets can be developed to be consistent with the use of the data.

9.1.9 Overall judgement on the suitability of MEAV valuations

The guidance to Reporters in Information Requirement H notes that:

Overall, the Reporters should make some judgement of the suitability of the MEAV measure for assessing the asset base, and how condition and performance gradings are assigned on this basis. The Reporters should consider this methodology in relation to those used in other utility businesses, specifically the water industry in England and Wales.

The use of MEAV or similar valuation (EARC) allows a proper representation of the data and so we believe that it should be maintained. We suggest that reporting on condition and performance should be limited to less frequent updates. In England and Wales, these updates would occur every 5 years as part of the Business Planning process.

We are not convinced that the analysis carried out to allocate MEAV or EARC by replacement period provides useful information. The method of analysis is prescriptive and does not align with Scottish Water's approach to asset management.

We understand that Scottish Water is developing it processes for asset management including the development of its Common Framework assessment for Q&SIIIB. We understand that these developments are being monitored by WIC. We recommend that the future of the H Tables is considered in the light of these developments. Scottish Water is undertaking an asset revaluation project on a MEAV basis. We understand that this will be completed for use in AR08.

9.2 Table H1: Asset Inventory and System Performance – Summary

Commentary by REPORTER

Introduction

Table H1 is a summary of Scottish Water's asset inventory presented in Tables H2 to H6. The audit of the asset inventory is reported against the individual tables.

The basic sources for asset data are:

- Water treatment works, water storage, water and wastewater pumping stations, dams and impounding reservoirs, raw water intakes and raw water aqueducts (excluding pipe sections) – data from Ellipse
- Water mains and pipe sections of raw water aqueducts – data from GIS
- Communication pipes – data from the comm. pipes inventory
- Meters – data from the Hi Affiinity system
- M&G assets – data from corporate databases and spreadsheets

Comments by Line

We have commented on the detailed movement in asset valuations in table H2 to H6.

Comments by Confidence Grade

For the first time this year Scottish Water has documented the approach to be taken to the assessment of confidence grades in a Technical Guidance Note. The derivation of confidence grades for each line in the H tables has been documented. So far, this approach has only been applied to the Summary of Asset Stock element of the tables.

As with previous years, the asset valuation continues to rely on:

- incomplete asset information which has been extended by assumption or extrapolation;
- valuation of limited samples of assets;
- some cost functions which rely on old data or data from other companies for which a clear audit trail is not always available.

In our opinion, the C5 confidence grade quoted for the EARC valuation is generally pessimistic for the infrastructure asset categories in Table H1. We would recommend a C4 confidence grade.

Scottish Water generally reports a C5 confidence grade for the allocation of EARC value between replacement periods. We believe that the results of this part of the analysis are not reliable. For example, the analysis places approximately 28% of the EARC value for water mains in Period 0 – replacement in 0 to 2 years. This suggests that work is required on over 5000 km of water mains per annum. We would recommend that confidence grades of D6 should be applied to this allocation between replacement periods.

9.3 Table H2: Current Asset Inventory – Water Non-Infrastructure

Commentary by REPORTER

Introduction

Key points

- Scottish Water has submitted a complete return of its water non-infrastructure asset inventory.
- Scottish Water has made further changes to its asset inventory in the report year by undertaking further reviews of the quality of its asset inventory including a review of the base information and asset surveys covering 2550 water non-infrastructure assets.
- The assets have been valued using the cost functions developed for the 2003-04 valuation increased by 17.91% to account for inflation (COPI 2003/4: 134 and COPI 2006/7: 158)
- Scottish Water has allotted confidence grades identical to those in AR 06. These were reduced compared with previous years. This is partly due to the fact that it has not completed its revaluation of its asset inventory on the basis of MEAVs rather than EARCs. The resulting confidence grades are accepted for AR 07.

Comments on Methodology

Asset Data

The basic source of asset data for non-infrastructure assets is the Ellipse system. Processes for updating Ellipse were audited and data examined for sample sites. Updated data for Ellipse comes from surveys, project completions, routine data-cleansing and from updates passed to the asset data help-desk.

All of the 2006/7 surveys were completed and uploaded onto Ellipse in time for the abstraction of AR 07 data. Updates to the asset stock resulting from project completions are now provided by the project manager on CD. These must be provided before CAPEX 5 approval is given and final payments are released, providing an incentive to project managers to provide timely information. Data cleansing exercises are carried out from time-to-time, involving Ellipse staff and Asset Planners to review and cleanse data on asset types which may be highlighted by either party. Finally, the asset data help-desk receives updates, mainly from operational and maintenance staff on changes in status of assets. The turnaround time for updates is 10 days and there is currently no backlog. Ellipse staff have been aligned with asset planners and operators for particular asset types to facilitate data improvement.

For all of the above categories of update, revised data is placed first in an off-line spreadsheet for checking with stakeholders. Logic checks are also made before amending Ellipse data. Ellipse is a live system, but a formal process is in place to track and record changes. Ellipse holds only real data. If information is unknown then a gap is shown and any infilling needed for asset inventory purposes is done outside the system.

Generation of the asset inventory

The process for generation of the asset inventory was audited.

Ellipse output, containing data at site, asset and sub-asset level was first segregated by asset type and WIC code.

The classification of WTWs has been reviewed in the light of revised guidance from WIC on revised categories SW0 – SW3. As a result, 115 out of 534 sites were reclassified.

Assets were then banded for size. Capacities were based on design capacity. In cases where the capacity was not known, capacities were infilled using the assumption that the spread of capacities among the unknown sites was the same as the spread among the known sites, for that particular operational area. The resulting spread of assessed capacities was then spread over the unknown set. Unknown capacities apply mainly to non-operational assets, including 4% of WTWs, 18% of water towers and 3% of service reservoirs.

Operational and non-operational sites were included and the data cleansed to exclude sold, PFI and 'phantom' sites. The latter are sites which appear on the record, which do not in fact exist, for example sites known by two names and entered twice.

Ellipse provides data on civil and M&E condition and performance down to sub-asset level. Gaps in the data set are filled by assuming that missing sub-assets have the same grading profile as known sub-assets of that type in the same operational area.

In light of the significant gaps in data which remain we recommend the following:

- A further programme of site surveys
- That the desk top exercise carried out for the return is built on to complete the gaps in the information.
- That the extent of extrapolation required should be reflected in the confidence grades for the EARC valuation. This has resulted in a lower confidence band this year.

We understand that this is being already being undertaken by Scottish Water as part of its MEAV valuation process.

Scottish Water has made a number of changes this year by continuing to cleanse its data. This is to be welcomed but clearly further work remains to be done.

The extrapolation used by Scottish Water assumes that the distribution of assets by size band is the same for assets with size information and assets without size information. We recommend that Scottish Water reviews this assumption. In the past we have found that size band tends to be missing for small works and the information available is biased towards larger works.

We note that the number of assets reported in the H Tables includes decommissioned and redundant assets. The equivalent data in the E Tables is limited to operational assets and, as a result, there are differences between the numbers of assets reported in the respective tables.

EARCs

Scottish Water states that it has continued to base its costs on EARC valuations rather than Modern Equivalent Asset Valuations (MEAV) as requested by WIC. Scottish Water states that a MEAV valuation would most likely be within the confidence band chosen. We accept that this is likely. We understand that Scottish Water is planning an asset revaluation exercise to start in early autumn and be complete by December 2007, to enable MEAV reporting from AR 08.

The EARC valuation has been prepared on the same basis as in previous years, based on the cost functions derived for the 2003-04 Annual Return updated by a factor of 17.91% to reflect inflation. A series of site specific costs are included in the EARC valuations to reflect the difference between the standard cost definition of the 2003-04 J Tables and the actual cost incurred under conditions experienced in Scotland.

A range of site specific cost adjustments was applied to reflect Scottish Water's assessment of the regional variation of construction costs across Scotland. The adjustment factor applied varied from plus 3.5% for the Central Belt to plus 42% for the Western Isles.

The allocation of site specific costs is based on two assessments by Scottish Water:

- An assessment of global site specific factors across Scotland. We understand that this is based on an analysis of completed projects but were not able to confirm this percentage in audit.

- A desk-top exercise undertaken by Scottish Water's staff to understand how regional factors might vary across Scotland.

The estimates for individual WTWs were used to prepare a function relating cost to flow for each treatment type. Separate civil engineering and M&E cost functions were prepared. The cost functions were developed using a statistical best fit technique to the estimates. These treatment works cost functions were applied to each works on the asset inventory using known or allocated design flow to estimate the EARC value of the works. Where work is done at a WTW a change in WIC classification may result. The application of the EARC estimating process will then result in a change in EARC for the site with a change in value which is unrelated to the value of the work actually done.

This method prepares estimates based on the actual sub-assets at a small sample of works in each treatment type. The EARC value reflects the mix and size of assets at this small sample which may or may not be representative of the asset stock as a whole. A different sample might produce a different EARC estimate for a particular treatment type. A similar approach was taken to the assessment of EARC for water storage and pumping stations, except that regional factors were not applied to pumping stations.

Scottish Water undertakes the analysis of replacement period and the distribution of EARC by asset life, condition grading and performance grading. The EARC estimate for a works is determined at works level. To populate the H Table, Scottish Water must first distribute the estimated EARC to sub-asset level.

The asset inventory does not contain sufficient information on size of sub-asset to allow individual sub-assets to be costed. Therefore Scottish Water has prepared a system of sub-asset scores based on the sub-asset EARC value for a sample of works costed at sub-asset level. These scores are applied to the sub-assets on the asset inventory. The estimated EARC value for each works is distributed to sub-assets by the weighted score of each sub-asset.

For AR 05 we carried out an audit of a sample of the individual works estimates, the method used to determine the weighting system for sub-assets and the distribution of EARC estimate to sub-assets. We were able to follow the methodology through the costing systems and established a clear audit trail.

The main weakness in the estimating procedure is the reliance on a limited sample of works for each type of works. The EARC valuation is dependent on the particular mix of sub-assets on the works valued. An alternative sample might produce a significantly different works cost function.

The estimates could be further improved by valuing the actual sub-assets at each works. We recognise that this would involve a substantial data collection exercise to collate the necessary data in a structured way. An alternative would be to repeat the exercise with a different sample of treatment works selected at random to determine whether there is any significant movement in the overall valuation.

As Scottish Water are going to undertake a new valuation we recommend that if sampling is to be used Scottish Water carefully examines the sample size needed on the confidence grade wanted.

Scottish Water reports that a significant part of the increase in valuation of its WTWs arises from a reclassification of surface water works from the SW1 classification to the SW3 classification. For the SW3 classification higher cost curves have been applied. There has been no underlying change in the assets.

Costs for pumping stations and water storage are estimated directly from a limited number of cost functions in Scottish Waters costing system which were developed to relate cost to volume (in the case of storage) and cost to power (in the case of pumping stations). As a result the EARC valuation for water storage and pumping stations are more directly related to the available cost data and less dependent on sampling and assumption to develop the EARC value and distribute cost to sub-assets.

Condition and Performance Grading

Scottish Water carries out condition and performance surveys of non-infrastructure assets at sub-asset level. This sub-asset data has been used to populate the H Tables.

Gaps in the condition and performance grading have been filled by using the distribution for assets with known grades.

For the 2003-04 return we undertook a detailed audit of the condition and performance grades for one water treatment works. We found that we were in general agreement with the condition and performance grades recorded in the asset inventory. While there were minor differences of opinion on individual grades, we did not note any systematic difference in the overall grading. During our audits of the Q&SIII Business Plan we visited a sample of works where we reviewed the condition and performance grade of the assets. During these audits we were able to confirm our view that the condition and performance grades on the asset inventory were reasonable.

This year Scottish Water has undertaken a significant number of further condition and performance surveys. We have reviewed a small sample of survey results, which include completed site capture sheets and supporting photographs. We have also reviewed the procedure used by Scottish Water. We have not undertaken any follow up site visits ourselves. Based on this review we believe that Scottish Water has undertaken the review in a systematic and well managed manner. The condition grades appear to be consistent with the photographic evidence.

Comments by Line

Lines 1 to 8: The EARC value for Water Treatment Works has increased by 10.0% to £2067.4m from last year's value of £1880.4m. 4.63% of the increase is explained by an increase in the COPI index. Scottish Water reports that the remainder of the increase arises from a reclassification of surface water works from the SW1 classification to the SW3 classification. For the SW3 classification higher cost curves have been applied. There has been no underlying change in the assets.

Lines 9 to 10: The EARC value for Water Storage has increased by 3.8% from last year's value to £985.2m. The EARC valuation has increased by 4.63% to account for inflation. The net reduction after inflation is associated with data cleansing, sold and demolished sites accounting for a reduction of 21 sites in total.

Lines 11 to 13: Although COPI indexing indicates a rise in costs of 4.63% to account for inflation, the EARC value for Water Pumping Stations has decreased by 16.3% from last year's value to £219.5m. This is due to a reduction of 14 in the number of stations reported and a reduction in total design capacity of 26% due to improved data from asset surveys.

Comments by Confidence Grade

Confidence grades for asset stock are shown as being improved from AR 06 as a result of improved asset data from asset surveys and data cleansing. This is accepted.

Confidence grades for the EARC valuations have remained the same as for AR 06. In our previous report we noted that the extent of data infill and extrapolation made a confidence grade difficult to assess but accepted the judgement made by Scottish Water.

We recommend that Scottish Water undertakes a robust analysis of the uncertainty in the various data sources which contribute to its new MEAV valuation to estimate the uncertainty in the reported values. This analysis would inform the assessment of confidence grades.

9.4 Table H3: Current Asset Inventory – Water Infrastructure

Commentary by REPORTER

Introduction

Scottish Water has submitted a complete return of the water infrastructure asset inventory.

Methodology

H3.1 – Dams and impounding reservoirs and H3.2 – Raw water intakes

No further asset surveys were carried out in the report year for these asset types. The basic data source for asset inventory is Ellipse and the methodology is substantially the same as described in section H2. The number of dams and impounding reservoirs has reduced by 38 to reflect disposals and better information.

Significant gaps remain in the information required to allocate the assets to size bands. For example, size band information is still missing on the 50% of the assets.

H3.3 – Raw water aqueducts

No further asset surveys were carried out in the report year for this asset type. Data are held in GIS in two categories; aqueducts (not usually circular) and raw water mains (circular pipes). The methodology for the latter is that described for water mains. The reported length of aqueducts has reduced by 73 km from AR06 due to abandonments linked to rationalisation.

GIS holds physical data, condition and performance grades for aqueducts. However there are significant data gaps and 37% of the total length of aqueducts required data infilling on diameters. In addition the condition and performance grades of aqueducts are assumed to be 3, unless there is better data from surveys or project completions, which applies to only a small proportion of the total length of aqueducts. Scottish Water noted its concern that better asset data is not held on these critical assets and informed us that they are included in its programme of work to improve asset information.

EARC valuation for aqueducts is based on size, length and ground type. The latter is assumed to be grassland and regional factors are applied. Unit costs are based on legacy data updated from the 2003/4 base using COPI.

For raw water mains the approach to the inventory is the same as that taken to water mains, described below. The corrosion and tuberculation model approach developed for water mains is used to determine condition and performance grade.

The EARC valuation is also determined using the methods outlined for water mains. The cost functions for water mains were developed from the same data set used to determine standard costs for mains laying in the 2003-04 Annual Return with appropriate adjustment for site specific costs. These rates cover a range of 150 to 600 mm. To complete the EARC valuation Scottish Water extrapolated the rates using a polynomial function. This creates significant uncertainty in the EARC values for aqueducts which have diameters up to 3000

mm. The rates for raw water aqueducts have been further enhanced to account for tunnels and pipe bridges.

A significant proportion (approximately 25%) of aqueduct lengths are assessed as being non-operational and there may be a small risk of under-recording of raw water aqueduct lengths due to incomplete information on operational status.

H3.4 – Mains Potable – Asset Data

The same methodology is used for mains potable (H3.4), mains other (H3.5) and raw water mains (H3.3).

Scottish Water has developed an Integrated Network Management System (INMS) which compiles and provides the information necessary to manage its water network. This system produces the information for the potable mains data in Table H3.

The length of main is taken from the corporate GIS data. The data was developed by integrating the data of the three former authorities. The quality of the data will have been improved by the process of screening and review undertaken as it was integrated into one system. It is subject to continuous checking in use. The updating process includes validation checks and there are routines in place to chase missing data, including cross-checks with Ordnance Survey map updates.

Data are extracted from GIS in four categories; aqueducts, raw water mains, service pipes and water mains. These are sorted into raw water aqueducts (H3.3), mains potable (H3.4) and mains other (H3.5).

Systems for updating the data for development, renovation and new construction were examined for AR 06. Procedures have been formalised for updating records and for rehabilitation work contractors have direct access for updating following the completion of work. Quality assurance procedures are followed: version control records changes and validation routines are imposed before information becomes the accepted version. The backlog of data entry for rehabilitation projects which was noted in last year's report has been dealt with. As a result the length of unlined iron main recorded in Table E6 has fallen from 16307 km in AR06 to 14209 km in AR 07.

For new developments, developers provide details of proposed new mains. Data are entered by Scottish Water and recorded as proposals until as-laid details are confirmed. Quality assurance procedures are followed. Routines are in place to chase missing as-laid information, including cross-checks with Ordnance Survey map updates.

For new construction, service providers enter data directly onto GIS and procedures are the same as for rehabilitation work. For minor works carried out on the network by Scottish Water and data arising from investigations or events, data are notified by Scottish Water to the GIS section who enter data using quality assurance systems and data validation.

For all types of record, changes site checks are carried out where anomalies are evident from information received.

The replacement of smaller diameter ferrous pipe with plastic pipe results in an apparent shift in size band from Band 0 to Band 1. This is because although these pipe types have similar internal diameters, the external diameter of plastic pipe (which is the basis of nominal diameter) is significantly greater.

We believe that an overall confidence grade of B2 for the length of main is reasonable.

For the preparation of the Annual Return it is necessary to infill missing data on GIS which is used to define and value the asset inventory. This data infill relates mainly to age, material and surface type, with diameter being recorded in virtually all cases. For the current report only 1.5% of length required data infilling of diameter, with all unknown diameters being infilled at 150mm diameter, the commonest category.

Age is assessed using housing age and where there is no other information pipe material is inferred from pipe age. Surface type is assessed using the Ordnance Survey Carriageway Alignment Register (OSCAR), which includes road construction data.

The on-going renovation programme is providing information which could be used to validate the condition and performance grading from the predictive models described below. For example:

- The asset condition grading and performance grading both rely on a corrosion model which is also used to identify targets to be considered in the renovation programme. During the renovation programme additional cut outs are taken and measurements made of corrosion and tuberculation. The results of these samples have been compared with the assessment made from the predictive model and the corrosion model amended.

- As renovation is carried out Scottish Water undertakes detailed assessments of individual zones to determine the extent of work required. Once renovation is complete Scottish Water will have determined that there are no Grade 5 mains remaining in that water supply zone. Until records are updated, the predictive models will continue to suggest that Grade 5 mains remain in the water supply zone post renovation. We recommend that Scottish Water considers how completion of renovation work in a water supply zone should be used when predicting the condition and performance grades for a water supply zone post renovation. We recommend that the predicted condition and performance grades of mains in a water supply zone before renovation and the extent of work identified as renovation is carried out are compared to either verify or adjust the current predictive models.

H3.4 – Mains Potable – Condition Grading

Water mains condition grading has been determined in two ways:

- By mapping burst data to mains and determining the burst frequency per km per year.

- By predictions of asset lives based on corrosion rates for ferrous mains and assumed asset lives for non-ferrous mains.

The worse of the two condition grades determined from the two methodologies has been used to complete the return.

Condition grading based on burst frequency

The assessment of condition grade is based on the analysis of 5 years records of bursts. Data for 2002-2004 was taken from legacy systems. A new method has been used for reporting mains bursts from 2004-05 onward. Data was taken from two sources:

- Burst records on the Works and Asset Management System (WAMS)
- Bursts identified through proactive leakage reduction.

The majority of data is extracted from the WAMS/Ellipse database and a small proportion from ongoing proactive leakage projects being carried out by SWS.

8 WAMS work order codes, with 4 descriptions, relate to mains bursts. The descriptions are as follows:

- repair burst<150mm
- repair burst>600mm
- repair burst 150 to 300mm
- repair burst 300 to 600mm

Work orders with the above descriptions were selected from WAMS. The data was then "cleansed" to remove work which is excluded by the WIC definition for D5.1. Duplications were also removed, for example, where Scottish Water staff had been called out to support SWS staff. Additional bursts were identified from the leakage reduction programme being undertaken by Scottish Water. Bursts in communication pipes were not included.

Burst data was mapped digitally and related to the nearest water main on Scottish Water's digital records of its network. A trace routine based on GIS is used to determine burst frequency per kilometre per year. The trace is carried out for 500m in all directions from the starting pipe and along all connected mains counting all bursts in each year. The trace continues up to a maximum distance of 500m unless:

- The diameter becomes more than 50% greater than the diameter of the start pipe.
- A different or unknown material is found. The trace skips over changes in material until 500m distance from the burst is completed. The length of main and number of bursts are counted where the pipe material is the same as the original pipe being assessed. This revised approach prevents gaps in the asset information isolating very small pipe lengths resulting in a high burst rate per kilometre.

Bursts which are older than the age of the pipe are not included in the analysis.

The trace counts the number of bursts in each year. The number of bursts/km/year is calculated as the average of the figures for each of the five years.

At present, burst records are not related to the individual asset but are mapped from either customer address or spatial references of an excavation. It is possible that the mapping procedure will allocate a burst to an adjacent main and not the correct main. The difficulty in assessing burst frequency is well known and we have noted that different companies adopt different methodologies for grouping bursts to determine a burst frequency. We believe that Scottish Water's approach is a reasonable method supported by rigorous systems of data analysis. In previous reports we noted that we believe it is essential that the general methodology adopted is maintained over time to ensure that trends can be identified and are not obscured by changes in methodology.

Condition grading based on predictive model for ferrous mains

The predictive model for condition grade of ferrous mains is based on samples taken from the network and subject to a rigorous process of measurement to determine corrosion rates. It provides a rational basis on which to understand the corrosion of ferrous water mains, focus further data collection and research and allow observed trends to be understood and their impact assessed in advance.

To assess a rate of corrosion on a pipe sample it is necessary to both measure the corrosion which has occurred and know the age of the pipe.

The age of the mains is determined according to a set of rules as follows:

- If date installed is available it is used, provided the material type was used for construction in that period. Date installed is available for approximately 50% of mains by length.

- If no date installed is available the age is determined by mapping housing data and relating the age of mains to the age of the housing stock, provided the material type was used for construction in that period. Housing age tends to be recorded in very wide age bands, with a single year (such as 1945) being recorded against a significantly longer time band. This may lead to some distortion of the analysis.

- Where there is no date installed or house age data, a default age is given based on material.

For each pipe cut out used in the analysis, internal and external corrosion is measured along the length of the pipe sample at up to 20 points. The internal and external corrosion rate is determined from the maximum pit depth divided by the pipe age. External corrosion rates are calculated for each material and soil type and internal corrosion rates are calculated for each material type.

Adjustments are made to rates calculated from small data sets to reflect the greater confidence in corrosion rates calculated from large samples sets.

The data indicates that corrosion rates are higher during the early life of a pipe and tail off as the pipe ages. To calculate the residual life, corrosion rates are applied at 125% of the average for the first 20 years and at 75% of average corrosion rates for the remaining period.

This observed change of corrosion rate over time may be due to the fact that inherent weaknesses will corrode out in the early life of a pipe or that corrosion products will mask the

base material over time and reduce corrosion rates. However, it may also reflect a self selecting data set. Corrosion rates for older pipes are derived from the pipes which have survived. By definition these will have lower corrosion rates than pipes of the same material which did not survive. As a result, the sample of older pipes may be biased to those which had lower corrosions rates because they had fewer inherent defects

The corrosion rates determined from the sample data are applied to calculate the internal and external corrosion for each ferrous pipe on the corporate data set. The residual life of the pipe is calculated from the time taken for internal and external corrosion to meet – when the pipe wall will have corroded to zero. The condition grade is allocated on the basis of the calculated residual life as follows:

Residual life	Condition grade
>60 years	1
>40 and <=60 years	2
>25 and <=40 years	3
>10 and <= 25 years	4
<= 10 years	5

Condition grading based on the predictive model for non-ferrous mains.

For non ferrous pipes the predictive models for condition grade are based on assumed asset lives related to soil type. Residual life is determined from the assumed life of the main and the age. Residual life is converted to condition grade using the same rules applied to ferrous mains.

Additional analysis has been undertaken on asbestos cement (AC) pipe samples based on cement loss and hardness to support deterioration model used for AC pipes, which currently account for 12% of the mains stock.

Correlation of condition grade from burst frequency data and the predictive models

Scottish Water grades pipes by condition grade using separate burst and predictive models. As with previous years, it is apparent that the predicted condition grade does not correlate with the burst data analysis. This may be due to a range of issues including:

- Burst data reporting systems may not be robust and bursts are under-reported. Bursts are identified from WAMS for repairs and from information provided by SWS for the proactive repair programme. WAMS data are cleansed to eliminate mis-codings.

- Is possible that that internal and external corrosion will not coincide in all pipes. Scottish Water has advised us that breakthough is most common at pipe crown and invert suggesting the external damage to coatings and corrosion or and/or wear coincide at these points.

- The use of average maximum corrosion rates makes no allowance for the extent of corrosion. The model may predict the first formation of holes in the pipe wall but this does not result in immediate structural failure.

- The use of average maximum corrosion rates does not reflect the impact of the variability of corrosion rates within a particular material and soil type.

- Default ages for pipes with unknown age may have a significant impact on the results.

- Age and soil type on their own give a poor indication of the risk of structural failure and more complex models should be considered.

We understand that the predictive model is taken as an indication of serviceability risk which identifies pipes for further detailed investigation to assess the need for rehabilitation or replacement. We recommend that Scottish Water review the predictive condition grade model in light of burst data and experience from its rehabilitation programme to better understand the link between the predictive model and serviceability.

H3.4 – Mains Potable – Performance Grading

Water mains performance grading has been determined in two ways:

- By making an assessment of the loss of through bore of ferrous mains caused by tuberculation.

- By determining the frequency of relevant complaints or regulatory water quality failures recorded in PROMIS and LIMS. The same trace and counting process is followed as for the burst condition grading, based on two years data from LIMS and three years data from PROMIS.

The worse of the two performance grades determined from the two methodologies has been used to complete the return. We note that no burst data are available for raw water mains and mains other.

Performance based on the predictive model for non-ferrous mains.

The assessment is based on an assumed linear relationship between tuberculation and pit depth with pit depth determined for ferrous mains from the corrosion model described above. The predictive performance model has a particular impact on old, small diameter, cast iron mains. The tuberculation model produces poor performance grades for small pipes because the reduction in bore for a given depth of tuberculation is significantly than in a larger diameter pipe.

Performance based on water quality and complaint data

A second assessment of performance is undertaken based on water quality and complaint data. The analysis is based on one year's data for water quality (from LIMS), but for three years of complaint data from PROMIS. Water quality data used is limited to one year to remove the impact of rehabilitation programmes.

Water quality data used in the assessment of performance grade is taken from the regulatory sample data set on Scottish Water's LIMS (Laboratory Information Management System). Water quality parameter failures in distribution zones are identified. Those with spatial references are mapped on the Scottish Water GIS. Water quality failures at the customer's tap recorded on LIMS for the following parameters are also included in the assessment of performance:

- Colour
- Iron
- Iron_manganese
- Manganese
- PAH
- Turbidity

Complaint data has been identified from Scottish Water's customer contact records (PROMISE). The following categories of contact are considered to be related to performance or water quality as experienced by Scottish Water's customers:

- WS No Water
- WS Airlock
- WS Intermittent Supply
- WP Low Pressure
- WQ Discoloured Water
- WQ Particles in Water
- WQ Stained Washing
- WQ Musty/Earthy Taste
- WQ Musty/Earthy Smell
- WQ Metallic Taste
- WQ Sample Request
- CR No Water
- CR On-going pressure problems
- CR Water main incapacity
- CR Water pressure
- CR Water Quality

Regulatory water quality parameter failures and relevant customer contacts are mapped on the GIS systems and attributed to the nearest water main. A trace routine is used to determine numbers of customer contacts or water quality failures per kilometre.

The key performance grades 4 & 5 are assigned as follows:

Perf. Grade	Criteria based on pipe sample predictive model	Criteria based on corporate data (per km)	WICS definition
4	For Unlined CI, SI, DI Pipe < 300mm: bore loss >20% and ≤ 40% Pipe ≥ 300mm : bore loss is >10%	Mains associated with water quality compliance failures and customer complaints for discoloured water or low pressure: • >1 up to 3 PCV failures for Fe, Mn , Fe+Mn or turbidity, or • >1 up to 3 complaints per year	Frequent problems causing complaints, water quality known to have failed on more than one occasion under normal operating condition during previous twelve months. Mains with tuberculation causing 20-40% blockage by encrustation.
5	For Unlined CI, SI, DI Pipe < 300mm: bore loss >40% Pipe ≥ 300mm : bore loss is >10% All mains with flaking coal tar pitch linings yielding particulate PAH	Mains associated with frequent water quality compliance failures and customer complaints for discoloured water or low pressure: • >3 PCV failure for Fe, Al, Mn and turbidity, or • >3 complaints per year; • DG2 listed property	Main suffering severe problems of infestations and loose deposits. Water quality cannot be ensured. Mains with tuberculation causing >40% blocking by encrustation.

We consider these trigger levels for corporate data to be reasonable. In the report year Scottish Water has taken steps remove abnormal operating conditions associated with its renovation programme from the analysis.

For the report year, three years data from PROMIS has been used to identify customer complaints. This leads to a continuing improvement in the consistency of the data available as the method could result in a main reported in performance grade 4 & 5 in this year's return not being reported in a subsequent return without any change in the status of the main. It would be useful to compare records of mains in performance grade 4 and 5 year on year. This would provide an indication of mains with sustained problems where a performance grade of 5 would be appropriate.

In the current report year the percentage of mains reported as being in performance grades 4 and 5 have reduced, due to a review of the corrosion model reducing the effect of tuberculation on the grade.

H3.4 – Mains Potable – EARC valuation

The EARC value for water mains has been calculated using cost functions for main laying based on the same data set used to develop standard costs in the 2003-04 Annual Return. The rates have been inflated using COPI indices of 142 for 2004-05, 151 for 2005-6 and 158 for 2006-7. The rates used cover a range from 150 to 600 mm. To complete the EARC valuation

Scottish Water has extrapolated the data using a polynomial function. This creates significant uncertainty in the rates for pipe diameters greater than 600mm. However, the value of mains in Band 4 with diameters greater than 600 mm is small and the uncertainty in the extrapolation of the cost function does not have a significant impact on the EARC valuation.

Scottish Water has assessed the allocation of surface type by using the GIS to relate the water mains to surface features identified on Ordnance Survey OSCAR data sets. No regional factoring is applied.

H3.5 – Mains other

The assessment of mains other follows the methodology outlined for mains potable above.

H3.6 to H3.7 – Communication pipes

Scottish Water does not have a corporate inventory of communication pipes. The return is based on a range of sources and assumptions including:

- The OS Address Point data set used to identify all addresses in the supply area.
- The OS Address Point data used to identify stacked properties assumed to be multiple occupancy. The number of communication pipes to a multiple-occupancy property was determined from a survey of properties undertaken in the former East of Scotland Water area and a rules-based approach has been derived to allocate numbers of comm. pipes to numbers of stacked properties.
- The age of the communication pipe, based on the age of the adjacent water main which was determined from either recorded data, age of housing stock or inferred from pipe material.
- Assumptions on material type.
- Communication pipe replacement data.

Lead communication pipe replacements are identified through WAMS and asset inventory is updated.

The assessment of material is based on the following assumptions:

- Galvanised iron for larger supplies including multiple occupancy >16, some public sites and larger business supplies.
- Lead for other communication pipes installed in 1963 or before and where LIMS data indicates lead.

During the report period a major update was made affecting the assessment of communication pipe material. This was based on:

- Lead surveys
- Revised Address Point data for tenements
- New age/property type data available at postcode level

This resulted in significant movement of numbers between material types, as in the assessment age is used to determine material. As a result of this exercise the assessed number of lead pipes was reduced by 176,000 and the number of other material pipes increased by 167,000. These changes principally affected areas of Scotland outside the Central Belt.

Condition grade is allocated on the basis of material and burst frequency. MDPE pipes are allotted a condition grade of 1, while all lead communication pipes are allocated a condition grade of 4 or 5.

Performance grade is allocated on the basis of material and water quality failures. In particular, all lead communication pipes are in performance grades 3, 4 or 5.

The EARC value for communication pipes is based on the replacement cost. The rates used are the standard cost rates for renewing communication pipes in the 2003-04 Annual Return. The rates have been updated for inflation based on COPI indices of 142 in 2004-05, 151 for 2005-6 and 158 for 2006/7. This results in a standard replacement cost of £424. All lead services are shown as having a remaining life of 1-2 years.

H3.8 - Water meters

The number of water meters has been taken from the Hi-Affinity billing system, records of meters read by Scottish Water and meters identified in previous asset inventories.

The number of meters increased by 5700 in the year, due to new meter installations. This figure includes a manual adjustment of approximately 4000 to allow for meters known to have been installed but not yet billed at the year end. There remains a difference between the number of meters in the asset inventory and the number of meters reported Table A1. We understand that the difference indicates meters installed but not currently used for billing and also the fact that as occupancy changes there may be more than one customer for any one meter in a year. We believe that the difference between the number of meters read and the number of meters billed should be considered as Scottish Water cleanses its billing records and an explanation provided of any remaining difference.

The performance and condition grades for water meters are based on the age and size of the meter. Condition grade and performance grade are assumed to be the same.

Comments by Line

Line 8: The number of water meters has increased by 5.4% in the report year, increasing the difference between the number of meters reported in the asset inventory and the number reported in Table A1. All water meters have been allocated to the "long" asset life category.

Comments by Confidence Grade

In Table H1, we have commented that we believe the confidence grades reported by Scottish Water for the allocation of EARC values to replacement periods are too high.

We recommend that Scottish Water undertakes a robust analysis of the uncertainty in the various data sources which contribute to its new MEAV valuation to estimate the uncertainty in the reported values. This analysis would inform the assessment of confidence grades.

9.5 Table H4: Current Asset Inventory – Wastewater Infrastructure

Commentary by REPORTER

Introduction

Scottish Water has made a complete return of its wastewater infrastructure asset inventory.

As in AR06, Scottish Water has included the length and the estimated EARC value of laterals as part of Line H4.2 – non-critical sewers. The inclusion of laterals within the non-sewerage stock is a potential source of confusion both within the report and when drawing comparisons with data from England & Wales. We recommend that Table H4 should be amended to include a separate category for laterals.

Methodology

H4.1 & H4.2 - Sewerage asset stock

The methodology in AR07 is the same as that used in AR06, therefore in audit we concentrated on any changes since the previous return.

Scottish Water based its assessment of depth, material and size of sewers, both critical and non-critical, on the following key sources of information:

- Sewerage records on the corporate GIS;
- Information returns from DAS studies - data from hydraulic models, CCTV and manhole surveys;
- Scottish Water Corporate CCTV database;
- A survey of a random selection of laterals;
- A digital terrain model for unknown cover levels.
- Wastewater connected property numbers
- Ordinance Survey Data

The allowance for development which was thought not to be fully represented on the corporate GIS, and which was included in AR06, has not been included this year. Scottish Water has stated that its "GIS Mission" project has led to a new process of inputting data from developments into GIS. Scottish Water has stated that there will still be a backlog, but that it will no longer be as large as in previous years.

There is also an ongoing Infrastructure Inventory Data Improvement Project (Q&SIII IIP40), which has been making changes and updates to the asset inventory.

The sewerage GIS was developed by integrating data from the three former authorities. The quality of the data has been improved by the process of screening and review undertaken as it was integrated into one system. It is subject to continuous checking in use. The updating process includes validation checks and there are routines in place to chase missing data, including cross-checks with Ordnance Survey map updates.

Scottish Water's drainage area study programme generates an improved understanding of its asset stock. In previous commentaries we recommended that these improvements should be entered into the corporate GIS. Starting in AR06, these improvements were being entered. We understand that the GIS data does not yet include a marker to show whether improvements arising from drainage area studies have been included.

In previous years Scottish Water undertook a survey of laterals identified at random to estimate the length of lateral in Scotland. In 2004/5 an estimated average length of a lateral of 6.66 m was used (compared with of 5.9 m per lateral used in the 2003-04 return.) In AR06 the approach was refined to take into account property type, extrapolating from sample data for the town of Wick, where laterals are included in sewer records. Lateral lengths were calculated for different property types (such as detached, semi-detached flats etc). This approach gives an increased average length of lateral of 6.76 m. As in AR06, an assessment across Scotland was carried out in the current report year to determine the number of properties of each type from the proportions determined in the 2001 census data and hence their total lateral length. The waste water connected premises figure differs from the previous report year and therefore the length of laterals differs. This has resulted in a decrease in the estimated total length of laterals, which are included in the reported figure for non-critical sewers.

Scottish Water has included a nominal 1000 km in the reported sewerage asset stock to allow for sewers constructed which may not be fully represented in the corporate GIS. This estimated 1000km is for missing inventory relating to properties known to be connected but where no corresponding sewers appear on the records. It is assumed by Scottish Water to be 500km surface water and 500km foul. Of this 50km is assumed to be critical and 950km non critical sewer.

In AR06, to complete the return, Scottish Water filled missing data using a series of rules based on experience of sewerage networks. This infilled data has been reused in the current report year. We consider this to be reasonable for the purpose of the asset inventory report. Data was initially in-filled from CCTV surveys, a digital terrain model and STC25 data (Standing Technical Committee, which recommended rules for recording sewerage information). The remaining gaps were then in-filled by an automated process based on connectivity. For example, for material and size, missing data was in-filled based on adjacent pipes. Manual sense checks on connectivity and diameter were also made on the data. The use of the available data appears reasonable for the purpose of completing the asset inventory.

There is limited information on surface type in the asset data. The proportion of grassland or pavement surface type has a significant impact on the EARC valuation. Scottish Water has used digital mapping (based on the Ordnance Survey Carriageway Alignment Register (OSCAR) to allocate surface type to individual sewers based on proximity to carriageway centre lines. As in the previous report year, we recommend that Scottish Water reviews a

sample of the data generated against actual surface types to confirm that the method and parameters used are reasonable.

H4.1 & H4.2 – Sewer categorisation

Sewers are categorised as critical or non-critical through an industry standard decision process which aims to determine whether pre-emptive rehabilitation is appropriate (critical) or whether sewers should be maintained on a reactive basis (non-critical).

AR07 methodology

In AR05 Scottish Water applied a methodology for the assessment of critical sewers which resulted in a significant increase in the length of critical sewer identified. The same methodology with some changes was applied in AR06. The same general methodology has again been applied in AR07, with a slight difference for sewers which were added in this report year. Sewers that were described by the process as critical or non critical in AR06 have kept that description. New sewers that have been added to the GIS have been categorised by the following process. They are deemed critical if:

- They are masonry or brick;
- They are foul sewers with diameter > 450;
- They are storm sewers with diameter > 600;
- They are at a depth > 4m.

Otherwise they are non critical. The lateral sewers are deemed to be non-critical, and the 1000km which are assumed to exist are split in the proportion 50 km of critical and 950km of non critical

Previous (AR06) methodology

In order to distinguish between this year's methodology and last year's methodology we repeat our description of last year. For the AR06 return, Scottish Water used the same, but slightly altered rule based approach from that in AR05 to assess the length of critical sewers across Scotland. As with AR05, the sewers were classified using a rule set developed to reflect the requirements set out in the Sewer Rehabilitation Manual.

The sewer classification rules set out in the Sewer Rehabilitation Manual include:

- Rules relating to physical characteristics of the sewer including depth, size, material and type of sewage carried. The information required is included in the asset inventory. Subject to the in-fill rules used by Scottish Water to complete gaps in the asset inventory last year, the data required is a matter of fact and classifications can be allocated with reasonable confidence.
- Rules relating to traffic flow. Scottish Water was not able to access structured information which would allow traffic flows to be included in the analysis. In the absence of this data road classification was used as a surrogate, in addition, this

year an assessment of traffic sensitive locations was used based on MolesEye data. Significant MolesEye designation types were selected, and assets within 5m of line objects from the MolesEye list, less than 200m long were included.

- Rules relating to ground conditions including soil type and water levels. In the report year Scottish Water was not able to undertake a robust analysis of ground conditions and this was omitted from the analysis.

The other sewer attributes used in critical sewer classification relate to proximity of the sewer to surface features. These are more difficult to assess using automated procedures. To undertake its analysis Scottish Water reviewed the proximity rules in the SRM and applied interpretations including the following:

- Any sewer where failure disrupts hospital traffic. Scottish Water used Yellowpoint to determine the locations of and health location with 'hospital' or 'infirmary' in their names – assets closer than 50m were identified.

- Sewers under railways, canals, rivers and motorways. Scottish Water used OS landline centreline data to pick out railways. For motorways OSCAR carriageway centreline data was used. For rivers and canals, all watercourses were searched for. The search included sewers in the vicinity as well as those under the features. In addition this year an assessment of traffic sensitive locations was used based on MolesEye data. Significant MolesEye designation types were selected, and assets within 5m of line objects from the MolesEye list, less than 200m long were included.

- Sewers under buildings other than prefabricated garages. Any sewer that crossed a building outlines was included.

- Any sewer where access could be difficult for repair following collapse. Scottish Water interpreted this as near a slope. No assessment was made to determine whether the slopes identified on mapping data would make the sewer difficult to repair.

- Any sewer in promenades or areas of high tourist attraction. The proximity of a sewer to mean high water springs was used as a surrogate. In addition, this year a list of tourist sites were derived from Ordnance Survey 'Strategic' mapping set, anything that was found to be open to the public was considered. 20m was used as the proximity distance.

- Sewers in main shopping streets. Yellow point data was used to select areas where there where postcodes with more than 20 retail or 10 manufacturing Standard Industry Codes. 25m was used as the proximity distance.

- Sewers in primary access to industrial sites. Last year, proximity to industrial estates was used for this attribute. This year, Yellow point data was used to select areas where there where postcodes with more than 20 retail or 10 manufacturing Standard Industry Codes 10m was used a the proximity distance.

- Sewers under or adjacent to high risk installations (gas electricity, etc.). Proximity to water mains with diameter> 300mm was used. Scottish Water was of the opinion that water mains of this size would be high pressure and therefore high risk.

- Sewers where collapse could cause serious pollution to grade 1 or grade 2 rivers. Scottish Water have used proximity to Shellfish waters and bathing beaches for this attribute.

Conclusion

In AR05 and AR06 Scottish Water considered a number of options and selected a fairly complex rule set which it considered provided a reasonable answer. The sewers added in AR07 have a more limited rule set for decision making. While the rules are not unreasonable they are not as fully representative of the Sewer Rehabilitation Manual as AR06. Different assumptions would lead to a different assessment.

For AR06, Scottish Water carried out some visual sense checks on the results from the above process, which are also applicable to the current report year, to determine if reasonable results had been obtained. Scottish Water also carried out cross-checks on a sample of actual sewers. We recommend that a more detailed cross check should be undertaken for a representative sample of the data to provide confidence that the assessment carried out for this return is reasonable.

H4.1 and 4.2 –Sewers – Condition Grading

The assessment of condition grading is based on the CCTV surveys and incidents recorded in PROMISE and WAMS. In common with other sewerage service providers, Scottish Water undertakes CCTV surveys almost exclusively on the critical sewerage stock where pre-emptive maintenance may be appropriate. Scottish Water has completed surveys on almost 50% of its estimated critical sewerage stock (see Table D6).

Scottish Water used industry standard software (Examiner) to prepare an assessment of sewerage condition grade. The procedure follows industry standard rules. The assessment from CCTV data for critical sewers has been based on a sample of CCTV surveys completed in the five years prior to AR06.

Scottish Water used CCTV condition data to develop a matrix of the proportion of sewer in each condition grade for each size band, for critical sewers. The proportions were based on the number of sewers in the category, rather than the length of sewer. This same profile has been applied to the critical sewers which have not already been graded due to an incident. These proportions have been randomly applied to the critical sewers which have not been graded by inspection. After the random process is carried out, some of the grades are overwritten with grades determined when known incidents have occurred on a sewer from the current report year, or when information from capital schemes is available, or when the exact location of a CCTV survey is known.. Known incidents are taken from Addresses in Promise and WAMS and linked to the nearest sewer to the OSAPR reference. This is a reasonable approach which makes appropriate use of the available data. It is likely that individual sewers graded by the infill process, will have different grades to those given in last years return, due to the random nature of the infill process.

Prior to AR06 Scottish Water applied the results from the critical sewer CCTV surveys to non-critical sewers.. In AR06 CCTV surveys relating to approximately 3000km of non-critical sewers were used as part of the assessment of condition and performance grade.

Scottish Water used the CCTV condition data to develop a matrix of the proportion of sewer in each condition grade for each size band, for non-critical sewers. This same profile has been applied to the non-critical sewers without condition grades for the current return. As with critical sewers, is likely that individual sewers will have different grades to those given in last years return, due to the random nature of the infill process. The CCTV surveys undertaken on non critical sewers were not a random sample as they were carried out as part of Scottish Water's operational activities. They were commissioned as part of investigations of particular issues and are likely to be biased towards sewers with poor condition and performance grading.

91% of the sewers have been given a condition grading from the infill process. The CCTV grading from the infill process is then overwritten by incident data. If the sewer was CCTV surveyed, the data is only overwritten if the incident occurred later than the CCTV survey. Nineteen different incident types which correspond to condition grading were identified on PROMISE and WAMs. If the incident occurred on a lateral it is not allocated to the critical and non-critical sewers, however, some incidents which occurred on laterals may have been reported as on main sewers or as unknown. Under these circumstances these incidents will have been applied to both the critical and non-critical sewers. Given that incidents only affect a small proportion of the network CCTV data remains the main source of information for condition grading.

CCTV survey is normally carried out prior to renovation and the condition grade determined from CCTV survey is probably representative of the condition of the critical sewerage stock before renovation was undertaken. We understand that post rehabilitation surveys have not been included in the CCTV data used to determine condition and performance grade profiles. As a result, the infill of condition and performance grade might not take account of the critical sewer renovation undertaken by Scottish Water to date and might over-report the length of sewer in condition grade 4 and 5. However we do understand that the sewers which are known to have been rehabilitated by capital schemes are overwritten after the infill process with a grade of 1, 2 or 3 depending on the method of rehabilitation adopted.

H4.1 and 4.2 –Sewers – Performance Grading

The methodology is the same as for AR06 where, Scottish Water based its assessment of the performance grade of sewers on a combination of:

- Reports of deposition taken from the CCTV records which were used to identify sewers in performance grade 1, 2 and 3
- Reported chokes (blockages), from PROMIS, WAMS and "Sewer Debrief" records, used to identify sewers in performance grade 4 and 5. The assessment is based on data from the last two and a half years.
- The operational CCTV survey data was used for the profile development for non critical sewers as per condition grading above.

Where performance grades were not known from survey, a random infill process along the lines of the condition grading methodology above was used to fill in the remaining performance grades across the database, using profiles for critical and non critical sewers. It

is likely that individual sewers will have different grades to those given in last years return, due to the random nature of the infill process. This data was then overlaid with known performance data. Again the profiles were based on a percentage of the number of sewers having performance grades, not the length, so due to the random nature of the process, the lengths in each grade will therefore vary year to year.

It has been noted that siltation proportions derived in this way are similar to those found in practice in drainage area studies, which lends credence to the approach.

Twenty-five different incident types in WAMS and PROMIS were used to identify incidents related to performance. Reported chokes were mapped to the nearest sewer on the corporate GIS. Incidents that were reported as being on laterals were not used. On Promise resolution data records whether a sewer is a main sewer or lateral. Cross-checks are also made with WAMS.

The profiles used this year for the performance infill process were the same as those used last year, so differences will be due to new data from Promise and WAMS in the current report year.

Scottish Water adopted the following performance trigger levels to allocate performance grades.

Perf Grade	**CCTV Examiner**	**Corporate Incidents**	**WICS definition**
1 Excellent	DE*, DEG*, DES*, OB* No applicable defects - max percentage =0	Entire Sewer replaced between manholes with new build; no events since	Properly designed, with self-cleansing velocity, no deposition or operational performance problems.
2 Good	DE, DEG, DES, OB - max percentage >0 and ≤5	sewer event frequency less than once in 5 years; Entire sewer relined between manholes with new build; no events since	As 1, but with sliming or minor deposition causing some hydraulic loss of pipe capacity.
3 Moderate	DE, DEG, DES, OB - max percentage >5 and ≤10	sewer event frequency twice in 5 years; flooding not affecting private property; sewer patch repair	Sewers with some sliming and deposition, minor backfalls causing loss of pipe capacity and surcharging of sewer at times of peak flow.
4 Borderline	DE, DEG, DES, OB - max percentage >10 and ≤15 And/or RM* present	sewer event frequency less than once a year; external floods not to private property; root clearance	Sewers which need to be occasionally cleaned out to prevent blockages, blockages within sewer occurring less than 1 in 5 years due to silting, which can lead to external flooding of property.

5 Fail	DE, DEG, DES, OB - max percentage >15	sewer incident frequency > twice a year; internal floods to private property; pollution caused.	Sewers requiring excessive desilting, or other excessive maintenance to prevent flooding of property or premature operation of storm overflows.

* DE debris, DEG debris grease, DES debris silt, OB obstruction, RM mass roots.

As reported in the previous year, we believe that the interpretation of performance grade 1 to 3 is reasonable. We believe that the definition applied to performance grades 4 and 5 should be reconsidered. A blockage may occur on any sewer due to a one off event which is not indicative of poor performance. The criteria for performance grades 4 and 5 refer to cleaning to prevent blockages due to silting. In the 2004/5 report we recommended that Scottish Water reconsider its definitions to ensure that it takes account of operational experience of repeat cleaning as opposed to one off events. We recommend that the Scottish Water continues to extend the time period used to determine the frequency of blockage.

Performance grading of non-critical sewers has been carried out using the methodology determined for critical sewers. A non-critical sewer data set has been developed from 3500 km of non-critical sewer surveys. We are concerned that the surveys may have been carried out to address specific needs and therefore are not a random sample; it is likely that the sample set is biased towards sewers with poor condition and performance grade.

H4.1 – critical sewers – EARC valuations

The EARC valuation was prepared using cost equations for sewer laying in three surface types and four depth bands. The cost equations were developed from a sub-set of the projects used to establish the standard costs in the 2003-04 Annual Return. The EARC valuations include site specific items to represent typical conditions in Scotland as opposed to the "greenfield" site conditions reflected in the standard costs. The cost functions were inflated by COPI indices of 134 for 2003-04 and 151 for 2005/6. This COPI value has increased to 158 for AR07.

In its Q&SIII Business Plan assessments Scottish Water increased its rates for sewer renovation to take account of a closer manholes spacing than that allowed in the standard cost definition. An adjustment was also made to address a concern that site specific costs had not been fully represented in the EARC cost functions. These adjustments have not been included in the current EARC valuation.

H4.2 – Non-critical sewers – Asset data.

The methodology for determining quantity of sewerage asset stock is set out above (H4.1 & H4.2 – sewerage asset stock).

The length of non-critical sewers has been determined from the critical sewer assessment described above.

The quantity of laterals has been assessed as 15,745 km based on sample survey as described above. This is a decrease of 190 km from the 15,935 km of laterals included in the asset inventory in AR06. All laterals are assumed to be non-critical in size band 1.

A nominal addition of 1000 km has been made to reflect Scottish Water's opinion that sewers are under-reported in the asset stock. 950 km of these sewers have been assumed to be non-critical and distributed across size bands 1, 2 and 3 in proportion to the provision of sewers in recent developments.

H4.2 – Laterals – condition and performance grades.

Prior to AR06, the condition and performance grading of laterals was based on a random sample survey of 206 laterals. In AR06 condition and performance data relating to a further 1000 km of laterals was incorporated in the assessment, improving confidence in the assessed grades. The same profile developed in AR06 has been applied to the lateral sewers in the current report year. The extra 1000 km of lateral surveys included in the assessment were surveyed in response to incidents and so does not form a random sample. It is unlikely to be representative of laterals as a whole.

H4.2 – EARC valuation – Non-critical sewers and laterals

The EARC is valued following the same methodology used for critical sewers.

As in AR06, Scottish Water has assumed that laterals can be valued as a sub-set of non-critical sewers using the same cost functions applied to the main sewerage system. We suggest that Scottish Water considers capturing information on the cost of laterals to test this assumption. We believe that the cost per unit length of installing short lengths of laterals with their associated chambers might be higher than the cost of installing longer lengths of non-critical sewer.

Line H4.3 – Sewage and sludge pumping mains

Scottish Water has determined the size and length of sewage pumping mains from information on the corporate GIS. A new process was undertaken this year for infilling missing data. The rising main lengths were traced and if a diameter and material was known at any point along the main – this diameter and material was applied to the whole rising main. If no diameter and material were known, a default value is infilled. All rising mains with no nearby information were infilled as 150mm There are also some new schemes with greater detail in the inventory this year.

As with AR06, the condition and performance grades of sewage and sludge pumping mains were based on age and material.

We understand that at present Scottish Water cannot relate bursts and blockages on sewage pumping mains to individual pumping mains to provide an assessment of condition and performance grade based on the definitions in the reporting requirements.

Line H4.4 – Combined sewer and emergency overflows

Scottish Water maintains a CSO database which was developed from legacy systems of the three former authorities and is updated as new information becomes available from the drainage area study programme, or when work is carried out on the Q&SII and Q&SIII programmes. As with AR06, a data harmonisation project has been underway to reconcile this data with the corporate GIS. More work has been done this report year and therefore this has resulted in some changes in the bandings of CSOs and EOs. Difficulties remain because it is not always clear whether it is the weir location or the outfall location which is recorded. The database records whether outfalls are screened or not. There are still around 300 CSOs which are in the CSO database but that are not on the main asset register, Ellipse.

The number reported in line H4.4 includes non-operational assets. The number of combined sewer and emergency overflows in the H Tables has increased by 8, from 4783 in 2005/6 to 4791. Movement between the bandings is due to the data harmonisation process leading to more information being available in the inventory. Reported numbers include both overflows from the sewerage system and those on wastewater treatment works.

As with AR06, the EARC valuation is based on a series of CSO surveys undertaken by the former East of Scotland Water Authority. The detailed assets reported for a sample of these surveys were costed by Scottish Water's cost consultants to prepare a cost function for CSOs based on volume. To prepare an EARC valuation the cost data was revisited to produce a cost function based on flow. The cost function used shows high variability of cost against flow and so it may give a poor overall indication for value. Again the figures will differ this return due to the harmonisation process.

Line H4.3 – Other sewer structures

The asset report for other sewer structures covers storage tanks on the sewerage system. The report year figures are based on a register of known structures. There are no changes to the figures this year.

As with AR06, the condition and performance grading return is made by allocating equal numbers of tanks to each condition and performance grade. Condition and performance surveys have not been carried out and this remains a small part of the total asset valuation.

The EARC valuation of other sewer structures has been made by assuming that the cost of other sewer structure is three times the cost of a rectangular tank. Information on the volume of tanks is limited and only one of three tank sizes have been used in the valuation.

Line H4.6 and H4.7 - Sea outfalls

As part of the Infrastructure Inventory Data Improvement Project (Q&SIII IIP40), Scottish Water has continued to review its base records of sea outfalls against information on the sewerage system on the GIS. Some diving surveys have been carried out on long outfalls and

the results of 6 of the surveys have been incorporated into the database. All asset types which were reported last year as sea outfalls have been further investigated. Abandoned and PFI tagged outfalls have been removed from the return. In a desk study, those found on plan to have no near upstream sewerage have been removed from the sea outfall list they are assumed to be highway drainage. This has resulted in a change in the total numbers.

We understand that further work is required to confirm and provide a robust data set of short sea-outfalls, and results from further surveys have yet to be entered into the system.

Condition and performance grading is based on age and material. Further improvements could be made if further surveys were undertaken and the condition and performance grade determined for each outfall.

The valuation is based on historic costs provided by Scottish Water's cost consultants. We understand that the cost relate to schemes undertaken in the United Kingdom in the mid 1990's.

Comments by Confidence Grade

We believe the confidence grades reported by Scottish Water are reasonable.

We recommend that Scottish Water undertake a robust analysis of the uncertainty in the various data sources which contribute to the MEAV valuation to estimate the uncertainty in the reported values. This analysis would inform the assessment of confidence grades.

9.6 Table H5: Current Asset Inventory – Wastewater Non-Infrastructure

Commentary by REPORTER

Introduction

Scottish Water has submitted a complete return of its wastewater non-infrastructure asset inventory.

Scottish Water has made further changes to its asset inventory in the report year by updating the information for investment, carrying out asset surveys and reviewing the base information.

The assets have been valued using the cost functions developed for the 2003-04 EARC valuation updated by COPI indices of 134 in 2003-04, 151 for 2005-06 and 158 for 2006-07.

Scottish Water has in some cases increased its confidence grades, due to the collection of asset data through asset surveys. We accept the proposed changes

Current valuations are based on EARCs rather than MEAVs. Scottish Water is currently commencing a re-valuation of its assets based on MEAVs. We recommend that the assumptions that Scottish Water plan to make in this work are discussed with WIC before work commences, to ensure that they are acceptable. .

Continuing significant changes to the asset inventory indicates the need for Scottish Water to continue to undertake the necessary work to ensure a robust asset inventory.

Comments on Methodology

Scottish Water's methodology for reviewing the asset stock, preparing an EARC valuation and assessing condition and performance grade is the same as the methodology described for the water non-infrastructure asset inventory (see our report on Table H2).

- Scottish Water has continued to update its non-infrastructure asset inventory by correcting errors and omissions in the base data that has been identified by Scottish Water's Asset Planners and other data users and through asset surveys. 2696 surveys were completed on wastewater non-infrastructure assets. Assets associated with capital projects reaching beneficial use were updated to reflect the investment made. A formal change control procedure is in place to record and track the changes made.

- The total number of sewage treatment works has not changed significantly since the last return. Movement in the bandings has been due to the infill process and to a programme of site surveys, data from which has been entered into Ellipse. An infilling process has been followed as in the previous report year to enter missing site data. "x factors" are infilled on a pro-rata basis in the proportion to those known in each band. Average values are used in each band (e.g. 4 for band 0, 11for band 1). This then enables the number in each band to be determined.

- Where there have been changes in the inventory for sewage treatment works they are due to site demolition (site not in AR07 return), sites being mothballed or abandoned (determined as redundant for the WIC return), data improvement, change of ownership or selling of sites (site not in AR07 return) upgrading of sites and new sites being commissioned (19 on the inventory this year).

- Condition and performance grades are infilled on a random basis for sewage treatment works based on the proportions of mechanical and civil sub-asset grades known. For sewage treatment works generally 20-30% of condition and performance grades are based on infilled figures.

- The works banding for table H5 is based on the nominal design capacity of the works. Scottish Water has made a considerable number of changes to design capacities. There are significant differences between these design capacities and the estimated load to the works derived for Table E8. .

- The EARC value for sewage treatment works is estimated from cost equations and on-costs for each asset type. The site sub-asset EARCs are calculated based on a weighting procedure for each site. The sub-asset EARC values are then used in the Asset Management System (AMS) to infill the cost distributions for condition and performance by asset life. These cost equations and weightings were developed by valuing the sub-assets for, at least, five actual works for each asset type. The sample works were valued for the 2003-04 Annual Return. The cost functions have been inflated using COPI indices of 134 in 2003-04 and 158 for 2006-07 AMS used a series of lookup tables to categorise the periods for each sub-asset and infill the cost distribution, the Gross, Net and Rdn EARC values for Table H5. We were able to confirm in the base data the total figures matched those returned. We note very large swings in estimates by replacement period. This still includes an analysis by risk and financial impact despite them being dropped from the main tables. We believe that the result is largely meaningless and if kept they should be linked to condition and performance only.

- The cost functions developed for each works type are dependent on the individual works included in the analysis. If an alternative sample of works was used to prepare a cost function, a significantly different EARC value might be generated for that type of asset.

- The methodology adopted by Scottish Water means that the type of works and population equivalent determines the asset value. It is possible for investment to create additional sub-assets but not change the type of works. In these circumstances asset investment will have increased the asset base without having any impact on the EARC valuation.

Comments by Line

Lines 1&2: The EARC valuation of sewage PS has increased by 1.77% to £295.07m. This is significantly less than inflation at 4.63%. This effect is due to significantly improved data on sewage pumping assets and capacities as a result of asset surveys, reflected in the EARC calculation.

Line 3: There has been a slight increase in number of septic tanks due to data improvements. The number of cess and septic tanks and the Gross EARC has not changed significantly from the revised value submitted to WICS in 2006.

Line 4: There is little movement in the total figures from last year. The Gross EARC has increased by 5%.

Line 5 and 6: There is a decrease of 11 Primary Treatment only works and 11 Secondary treatment works on the inventory this year. The Gross EARC has reduced by 4% for primary treatment works and increased by 2% for secondary treatment works from last year.

Line 7: There is an increase of 9 tertiary treatment works on the inventory compared to the previous year. The Gross EARC has increased by 6%.

Lines 8 to 13: The EARC valuation of sludge disposal has decreased by 5% to £159.2 M. This is largely due to the review of the design capacity of every site. The review resulted in a 19% reduction in design capacity. The reduction in valuation due to reduced size is greater than the increase in COPI.

Comments by Confidence Grade

The confidence grades are C4 for the works EARC values which is the same as last year and reasonable. The confidence grades for the condition and performance distribution EARC is unchanged from the previous return at C5 which is reasonable.

We recommend that Scottish Water undertake a robust analysis of the uncertainty in the various data sources which contribute to the EARC valuation to estimate the uncertainty in the reported values. This analysis would inform the assessment of confidence grades.

9.7 Table H6: Current Asset Inventory – Support Services

Commentary by REPORTER

Introduction

Key Points

- This year we have not audited vehicles and plant and telemetry systems, which were audited last year.
- In the initial version of Table H6 seen during the audit, leased as well as owned offices were included in the reported total of 73. Leased offices have been excluded from the final version, giving a revised total of 68 depots and workshops. A programme of asset surveys was carried out during the report year covering 47 of the total 80 offices, depots and control centres. During these surveys floor areas were measured and condition grades reassessed. These were incorporated into the return. Other floor areas have been estimated from unit areas per workstation and other standard criteria, rather than measuring the building or building plans.
- Table H6 is consistent with Table E11. The 68 depots and workshops reported at line H6.2 in the final version of the table refers only to owned properties and includes 5 which are no longer in use. Coincidentally 68 depots and workshops are reported at line E11.9. This total refers to properties in use during the year and includes 5 which are leased.
- Property EARC values are approximate and based on valuations carried out for the Business Plan in 2004, updated by COPI indexing. Scottish Water accepts that the basis for property valuation needs to be improved and accepts that a formal valuation of its larger items of property should be carried out before the next Business Plan is submitted.
- Information systems returns are based on properly maintained databases and should be reasonably accurate.

Comments on methodology

Comments on methodology are included in the line commentaries for this table.

Comments by Line

Lines 1, 2 & 3: The basic data source for property returns is the spreadsheet maintained by Property Facilities. This covers properties managed by Estates (legal title, farms, forestry and houses), Property Facilities (non-operational buildings) and Property Maintenance (operational buildings). The spreadsheet is not a live document, but revisited annually for the Annual Return, when known changes are made. A closure programme is under

way and it is not clear that the spreadsheet is fully up-to-date in this respect, as it contains buildings with proposed closure dates which have already passed. Scottish Water accepts that there would be value in rebasing the list.

Offices are defined as buildings having more than 100 workstations. The 11 offices include Watermark House which is leased by Scottish Water (and who are liable for its maintenance) although SWS are using it. Offices with 100 or fewer workstations are reported as depots. Scottish Water reports that it does not have any separate workshops, although some depots have limited workshop facilities.

The number of depots and workshops reported at line H 6.2 (68 owned properties, including 5 no longer in use) is consistent with the 68 reported at line E11.9 (68 properties in use, including 5 leased).

Numbers of offices and laboratories and control centres are unchanged from last year. Asset surveys carried out during the report year re-measured floor areas, which were incorporated into the return. Other floor areas have been estimated from unit areas per workstation and other standard criteria, rather than measuring the building or building plans. Scottish Water expects to show amended floor areas for all properties following the completion of the asset survey programme in report year AR 08.

Condition grade is listed for each property. Grades have been reassessed during asset surveys for 47 properties. For the remaining properties, condition grade is assumed to be as AR06. EARC tables reflect a spread of performance grades identical to that used in previous years and last assessed in 2004 for the Business Plan. Valuations have also been carried forward from previous years with COPI updating, also being last assessed in 2004 for the Business Plan.

We have not formally audited EARC values this year as previous values have only been updated by COPI. During our audit for AR05 we noted that similar costs were sometimes used for properties that were obviously different in size. We accept that these might represent reasonable averages based on a more detailed analysis but were unable to ascertain this by audit. We do not believe that the EARC values are based on a formal valuation by qualified chartered surveyors and so are subject to uncertainty. Scottish Water's confidence grade of B3 is therefore possibly a reasonable reflection of the likely accuracy, although without a formal valuation it is difficult to quantify the likely accuracy of the estimate. This would be rectified by the proposed asset revaluation exercise.

Line 3: Scottish Water has consolidated its control centres into a single control centre at Balmore Road. We noted in our commentary for AR06 that the gross EARC value of the Balmore Road control centre is only just lower than the value of the 3 previous control centres. Scottish Water was

understood to be reviewing this valuation but the reported valuation is unchanged this year.

Lines 4 & 5: These lines have not been audited.

Line 6: The basic data source for IS is the live IS inventory. This is updated on a day-by-day basis and is a live management tool. Data for AR 07 were obtained by taking a download of the database on 31.3.07. All IS assets are allocated to offices, not people, although the whereabouts of portable items such as laptops can be determined each time they log on. This database justifies the allocated confidence grade of A2 for asset stock.

The database lists comprehensive information on each asset including; site reference, asset ID and categorisation, reference number, model name, date delivered, condition and performance grade, EARC, life categorisation, criticality, gross EARC and age.

Condition and performance grades are allotted on the basis of straight-line deterioration from 1 when new to 5 when due for replacement. This profile is modified in a few cases for performance where the performance history of a particular asset is known from fault reports. All IS assets are written off after three years, although some items such as the Riverside House and Bullion House data servers are considerably older.

Gross EARC is calculated as the new replacement cost of all IS stock. Costs are for the hardware only. Software costs and costs of putting the systems to work are not included. Replacement cost is difficult to assess, particularly in the case of servers, because technological advances mean that equivalent items are no longer available. This uncertainty is reflected the confidence grade of B3 in EARC.

Net EARC is given on the basis of straight-line depreciation over three years from the gross EARC. Net EARC is given as £0.470m for AR 07, reflecting the fact that almost all IS assets are approaching the end of their assumed lives. It appears that net EARC was overstated in AR06 at £9.7m. A large replacement programme is scheduled to start soon for IS assets.

Line 7: This line has not been audited.

Comments by Confidence Grade

We generally accept Scottish Water's confidence grades, particularly now they are supported by a greater proportion of asset surveys. We give further commentary on confidence grades in Table E11.

10. SECTION P: TARRIFF BASKET INFORMATION

10.1 Overview

Key points

- The P tables are consistent with the A tables. In general our comments on the A tables relate also to the P tables.

- The Reporter's team undertook sample audits to understand Scottish Water's methodology and test data sources. Through the audit it was possible to verify that measured and unmeasured non-domestic property information is derived from Scottish Water's billing system, Hi Affinity, which also provides data used to prepare the WIC 22 reports. Customer numbers are reported at September 2006 while the reported volumes cover all customers served in the report year. Scottish Water has continued to put a considerable amount of effort into cleansing the data on Hi Affinity, with particular emphasis on voids and unmeasured non-household properties. High Affinity passed to Scottish Water Business Stream at 01 November 2006.

- A small increase in the number of measured voids was noted compared with AR06, the aggregate effect of properties being added to and removed from the voids list. Around 3000 previously void properties were returned to charge in the year. All meters read are billed, unless listed as void, or known to relate to demolished properties. It is known that some meters still exist for demolished properties.

- Unmeasured non-household voids appear high compared to other property groups. Scottish Water has set up a Revenue Max team, whose job is to focus on voids. Scottish Water will be able to better explain the reasons for the high unmeasured voids better next year.

- Hi Affinity data is currently being transferred to the Ellipse system to form the asset inventory for meters. This process is not yet complete. Routines will need to be developed to ensure that the two systems remain synchronised in future.

- Scottish Water's report on unmeasured domestic properties was previously based on the quarterly WIC4 returns from councils; this not the case for the 2007 Annual Return. To produce figures for AR07, the 2004 WIC4 figures have been updated using growth figures which were calculated from the Ctaxbase returns of 2004, 2005 and 2006. These figures are then reprofiled into the format required for the P tables.

- Scottish Water has difficulty in providing reasonable banding figures for the return. We recommend that WIC, Scottish Water and the councils work together to see how the base figures from the councils can be improved.

- The tariffs reported for 2006-07 reconcile to the Scottish Water schemes of charges for 2006-07. Separation of the wholesale and retail business occurred part way through the report year. The 2006-07 revenue calculation in the P Tables makes no allowance for wholesale retail separation. The tariffs reported for 2007-08 are the draft wholesale tariffs resulting in a reduced estimate of revenue.

10.2 Tables P1 to P10

Comments on methodology

Methods used to populate the A and P tables are now consistent. For more detailed comments on methodology see our narrative on the A tables and below.

Comments by table

Table P1 and P5 – Unmeasured household

General

Scottish Water's report on unmeasured domestic properties was previously based on the quarterly WIC4 returns from councils; this not the case for the 2007 Annual Return. To produce figures for AR07, the 2004 WIC4 figures have been updated using growth figures which were calculated from the Ctaxbase returns of 2004, 2005 and 2006. These figures are then reprofiled into the format required for the P tables.

The Ctaxbases for 2000 and 2006 and the Scottish Executive 2004 based occupied household projections, and the recent midyear update, were used to calculate growth in occupied households for each council tax area. They were also used to calculate the total number of households, the number of unoccupied households, the occupied household populations with water and wastewater and the population not in households with water and wastewater, in each council tax area therefore giving the projected figures for the report year plus 1.

The 2006 WIC4 Return to Scottish Water identifies five categories of property depending on the reduction applied to the Council Tax and water bill:

- No reduction (full payment).
- New reduction (up to 25%)
- 25% reduction
- 50% reduction
- No charge.

In the WIC4 return the councils specify the level of reduction applied but not the reason for the reduction. In particular, Scottish Water is not able to determine from the WIC4 return whether:

- A property which is connected to a service but not charged is a "no charge" or is void.

- A property receiving a 50% discount is a second home, long term empty or disregards or subject to more than one 25% reduction.

In the Ctaxbase a reason for the reduction is given.

Scottish Water has stated that it did not use this year's WIC4 in its entirety. It determined that the data was short in respect of around 19,000 properties. It knew that out of the 32 Councils, 15 were reporting correctly, but it was also aware that out of the 17 left (who were Northgate

software users) some of them were including second homes in the data and others were not. They could not match up the data for these Councils and therefore could not confirm the data and calculate an accurate growth figure. They therefore updated the 2004 WIC4 figures with growth from the Ctaxbase data. However, SW did determine that the data from the Sept 2006 WIC4 for the less than or equal to 25% discount figures could be used for the calculation, because the Councils report a monetary value to Scottish Water each month via their financial statements. This monetary value was then used as guidance to match to the calculation produced on the Sept 06 WIC4.

In the P tables for AR07, the discount banding has been changed from the previous report year and now contains a row for properties receiving up to 25% discount. Data is received from councils in varying formats. The 2006 WIC4, details in each property band those with no benefit, partial benefit and full benefit, and has split the figures out into no reduction, new reduction (up to 25%), 25% reduction, 50% reduction and no charge. Not all councils provided data in each reduction category and SW has had to make an assessment based on the known figures to allocate the unknown figures into the correct columns. The 2006 WIC 4 also detailed no reduction, new reduction, 25% reduction , 50% reduction and no charge, but in the no reduction columns sometimes there was data in the partial and full benefit column. SW states that this is clearly wrong and believe that this is a holding area for people to be put into the correct place. It did not use these figures.

As in previous years, it was necessary to reprofile the data so that it is in the correct format to match that required for the P tables.

- In a spreadsheet based on the P tables, Scottish Water initially entered the data for the current report year.
- As previously discussed, the number of households in the ≤25% rows were taken from the 2006 WIC4.
- The number of households in the 25% rows were based on WIC4 and ctaxbase growth
- The number of households in the 50% rows were based on the 2004 WIC4 and ctaxbase growth, adjusted for discounts and disregards.
- The number of households in the full charge rows were based on the 2004 WIC4 and ctaxbase growth, adjusted for discounts and disregards.
- The figures were adjusted first for benefits, then for discounts and disregards. For this calculation SW had to make some assumptions in the splits as some councils did not provide the data in the required format.
- The long term empty and second homes figures were removed from the 50% rows and added to the full payment rows. The disregards were left in the 50% row (Some councils returned data correctly for the split between second properties, long term vacants and disregards but others did not. SW used the data which was known to proportion out the data which was unknown for these three types). SW has stated that there is a potential problem for next year as they will lose visibility on vacant properties.

- For projections into the future, the same adjustment spreadsheets and methods were used.

At the audit we were able to follow the calculation process through to those figures reported in the P tables.

The total number of properties connected to water supplies, including exempt and void properties, is 2,342,414, which is an increase of 19, 289 since last report year.

The total number of properties connected to wastewater supplies, including exempt and void properties, is 2,262,924 which is an increase of 19, 289 since last report year.

Band D Equivalent Calculation

The Band D equivalent calculation is generally as per previous returns, with a slight change for the new reduction, and has been calculated as detailed below.

The number of properties in each Council Tax Band is weighted as follows:

Council Tax Band	Proportion of Band D Charge
AT	5/9
A	6/9
B	7/9
C	8/9
D	1
E	11/9
F	13/9
G	15/9
H	18/9

Taking an example of a number of Band A properties:

Band A with no reduction: 120000	Band D equivalent is 6/9 of 120000 = 80000
Band A with ≤25%: 120000	Band D equivalent is 85% of 6/9 of 120000 = 68000 (i.e. SW are assuming reductions are on average 15%)
Band A with 25% reduction: 120000	Band D equivalent is 75% of 6/9 of 120000 = 60000.
Band A with 50% reduction: 120000	Band D equivalent is 50% of 6/9 of 120000 = 40000

Band X properties are those on the Council Tax register which cannot be identified for the purposes of billing, or are those whose billing band has not been determined and therefore do not receive a bill. Band X properties therefore do not appear on the Ctaxbase. Band X properties are not included in the figures reported in the Annual Return.

Band A* is the same as Band AT, and is a band for properties in Band A which have a disabled person living in the property. Disabled relief results in a property being moved down one Council Tax Band. In the P tables, these properties are reported in Band A*.

It was noted by Scottish Water, that the Band D equivalent figure for this year compares well with the prediction figure in the previous report year, and is lower than the reported figure for last year.

During the audit we were able to confirm Scottish Water's calculation of the equivalent Band D properties.

Tables P2 and P6 – Unmeasured Non-Domestic

Data on both unmeasured non-domestic properties and all measured properties have been taken from Scottish Water's Hi Affinity billing system using a download taken at September 2006.

A comprehensive set of query routines based on a detailed technical specification have been produced to generate the outputs for the Annual Return. In a small sample we were able to audit the reported data through Hi-Affinity to the output generated by the routine. These queries generate the information used both the A and P tables which are therefore consistent.

During the report year Scottish Water has put in a significant effort to cleanse the direct billing data on Hi Affinity. This is now substantially complete apart from the need to further cleanse data on voids. The on-going data cleansing is one reason for movements in reported numbers from previous years. As part of the data cleansing exercise Scottish Water has pursued non payment of bills with a view to agreeing base information on the property with the customer that frequently was a reason for bills not being paid. This has resulted in a significant fall in aged debt from non domestic customers.

High Affinity holds all data on rateable values, billings and revenue which form the basis of the tables.

Following the final determination, Scottish Water has installed approximately 6000 meters and plans to install a further 24,000 meters in this financial year to convert virtually all unmeasured non domestic customers to metered supplies. However, these meters will not be used for tariff purposes until 2010. They therefore do not affect the numbers of unmeasured non households in this year's return.

Historically Scottish Water has had 2000 non domestic optants per year. To this Scottish Water has added the WIC assumption of 500 new non domestic customers per annum. Scottish Water has based its projections in the P tables on these figures. This is inconsistent with lines 8 and 9 in table A1 which assume that there will be no optant.

Tables P3 and P7 – Measured Domestic

Scottish Water has very few measured domestic properties. Scottish Water reports that this year a full audit and flagging of metered household customers was carried out. This brought to light customers who had not been flagged as measured households but which were nonetheless charged on the measured household tariffs. Scottish water has corrected these records. This reassessment accounts for the 24% increase in measured households since AR06 (481 to 595) Consumption from metered domestic properties is higher than that from unmeasured domestic properties. Scottish Water reports that this is due to the fact that these properties are often farms and other multi occupancy properties such as holiday cottages.

The number of measured domestic properties reported was reconciled with revised data downloaded from Hi Affinity at the end of September 2006, which forms the basis of the data reported in the tables on all measured properties. The end-of-September data slice was analysed using the Business Objects tool to produce a list of all meters, recording size and type. This process was audited and seen to produce an accurate analysis. Hi Affinity records information by meter, not customer, but the system also records numbers of meters per customer. Hi Affinity also records actual meter size where this is different from the meter size used for tariff purposes.

The total volume for measured household properties in Line P3.11 (116,715 m3) does not reconcile with measured household water delivered in Line A2.13, which gives an annual volume of 120,450 m^3. This is due to the fact that meter under-registration is included in the A tables and not included in the volumes billed which are reported in the P tables.

Table P4 and P8 – Measured Non-Domestic

For comments on methodology see the section on unmeasured non-domestic properties above.

Volumes are generally obtained from monthly or quarterly meter readings. These are adjusted at the year ends by interpolating between readings at the beginning of the year and extrapolating using the average daily figure calculated from the last 365 days when meter readings had been taken. This extrapolation may slightly bias the results if there are significant consumption fluctuations between summer and winter in the larger water using industries. Scottish Water believes that taking the mean daily consumption rate for the entire previous year will be preferable to attempting to make seasonal adjustments.

This year information for non-household properties in the A tables and P tables comes from the same source, Hi Affinity. Data checks confirmed that these tables are consistent. For the current year each line total in the P Tables is supported by a list of the properties allocated to that line.

In Block A, numbers relate to actual numbers of meters and not properties. In some cases properties will have more than one meter. The meter sizes will not always relate to the meter in the ground, where these are deemed to be oversized. Hi Affinity has information on numbers and both the installed meter and size used for tariff calculations.

A small reduction has taken place in the number of measured non-household properties, due to continued cleansing of data to remove non-valid properties.

The total volume of water delivered (line 4.29) is consistent with the water delivered figure at line A2.15. The total volume from measured non-domestic properties (Line 8.23) is consistent with measured non-domestic foul volume at line A2.42.

Tables P9 and P10 – Drainage Charges

Information on property drainage charges is abstracted from Scottish Waters billing system.

Properties receiving sewerage services are liable for drainage charges to cover property drainage and road drainage. Drainage charges for un-measured domestic customers are included in the general tariff charged.

All connected properties are subject to road drainage charges on the assumption that a property connected to the sewerage service receives a benefit from the drainage of roads provided by Scottish Water.

Connected properties which can demonstrate that they provide alternative arrangements for property drainage are exempt from charges.

Road drainage charges are applied to 212 of the 222 measured domestic properties connected to the sewerage service. Property drainage charges are applied to the 200 properties, 12 properties have demonstrated that they have made other arrangements for property drainage.

We have not audited the distribution of measured domestic properties receiving drainage services by council tax band and exemptions.

24 non-household properties pay area based charges. This relates to the legacy of a scheme offered in one council area now discontinued. The assessment of area reported in line P10.13 is inherited data and records to support the historic assessments are not necessarily available.

Properties paying non-standard tariffs relate the special agreements. The number declines are the agreements expire. The company is not entering into new special agreements. We understand that all special agreements relating to drainage charges will have expired by 2010.

We understand that the Scottish Executive is consulting on drainage charges based on area as opposed to the general basis of charging on rateable value. Scottish Water is currently undertaking work to assess area of properties paying drainage charges through surveys, desktop mapping exercises which will allow it to assess the impact of potential changes.

Comment on Confidence Grade

Scottish Water has assigned a confidence grade of B2 for unmeasured properties by band, the same as the overall confidence grade in table A1. It is difficult to assess the accuracy of the estimates given the projections and extrapolations that Scottish Water had to make. Overall we accept the grade.

For all measured properties and unmeasured non-households we note that Scottish Water has reported confidence grades of:

- A1 for tariffs,
- A2 for numbers, volumes and loads discharged,
- A2 for revenue.

The confidence grade for numbers, volumes and loads discharged has been raised from A3 in AR 06 to A2 for AR 07. On the whole we believe that this is justified on the basis of data improvements to Hi Affinity.

In Table A1 we noted that there is uncertainty around the numbers of unmeasured non households. We also note a very high level of voids in these properties. Given this information, and until Scottish Water completes its proposed surveys, we believe that it may be more appropriate to apply a confidence grade of A3.

10.3 Tables P11 and P12 – Trade Effluent

Key points

- In previous years the company has amended the tariffs in Table P12 to reflect ensure that the reported revenue to trade effluent equalled the actual revenue. This has not been done in the report year.

- In the report year the company has reported the number of trade effluent consents against which a bill was raised in the year. A consent is linked to a property and can transfer on change on owner. In previous years Scottish Water reported the number of customers. There is a significant increase in the number of properties in table P11 as a result.

- The tariffs reported for 2006-07 reconcile to the Scottish Water schemes of charges for 2006-07. Separation of the wholesale and retail business occurred part way through the report year. The 2006-07 revenue calculation in the P Tables makes no allowance for wholesale retail separation. The tariffs reported for 2007-08 are the wholesale tariffs resulting in a reduced estimate of revenue.

Comments on methodology

The figures reported in the return are for the year end. The reporting requirements call for mid-year figures.

The reported figures include all trade effluent discharges recorded in the report year including those which started and those which were discontinued during the report year.

A trade effluent discharge consent is attached to the discharge and not the discharger. If ownership of the premises changes in the report year Scottish Water will charge more than one discharger for the same discharge. We understand that in the report year the number of trade effluent discharges reported is the number discharges as opposed to the number of discharge/owner combinations or the number of customers. This explains the marked reduction in properties charged in P11.1.

The billed trade effluent volume is estimated in one of four ways:

- Direct measurement of trade effluent flows. This is used on an limited number of discharges where direct measurement provides a degree of comfort to the discharger.

- By measured water supply less an allowance for domestic discharge and a further allowance for water not returned to foul sewer because it is consumed in product, cooling water or by other means.

- By meter readings of other private water supplies less an allowance for domestic discharge and a further allowance for water not returned to foul sewer because it is consumed in product, cooling water or by other means.

- By a nominal agreed estimate (limited to very small discharges where any form of measurement would be expensive relative to the revenue raised.

The trade effluent charges make an allowance other water use, typically:

- Wastewater discharged and charged as domestic wastewater from non-domestic premises.
- Wastewater which is not discharged to Scottish Water's sewerage system,
- Water used in product.
- Water evaporated as part of distillation or cooling.

The trade effluent charges are generally based on the volume of trade effluent discharged in the year and the average concentration of COD and suspended solids in the previous calendar year. This provides a degree of stability and predictability in the charges levied. Traders may opt to be charged on samples in the year but few chose to do so. The trade effluent loads in Table A2 are based on the actual measured COD in the report year and will vary from the trade effluent charged.

During our audit we were able to follow audit trails through the billing records demonstrating the use of measured volumes and concentrations to determine revenue and the quantities in Table P11 and P12 During these audits we were able to:

- Confirm on a limited sample basis the calculation of trade effluent loads from measured volumes and concentrations in Scottish Water's records.
- Review Scottish Water's calculation of harmonisation caps and therefore Scottish Water's allocation of discharges to this categories.

From these audits we concluded that:

- Scottish Water was able the demonstrate records supporting trade effluent agreements including categorisation of those agreements.
- Scottish Water was able to demonstrate procedures for setting, monitoring and enforcing trade effluent consent conditions.
- Some discharges which move out of harmonisation charges in one year might move back into harmonisation charges in a future year depending on the load and volume discharged.

Trade effluent discharges charges for the report year are set out in Scottish Water's document "a clear look at charges – charges for commercial customers and other licensed activities 2006/07", a copy of which was provided by Scottish Water. We have confirmed the standard availability charges and standard variable charges in table P11 against these published charges. These rates are also entered in table P12 lines 22 to 25and 30 to 33 which do not reflect the reduction in revenue from harmonisation caps.

The charges for 2006-07 are the retail charges. The charges for 2007-08 are wholesale charges.

Comments by Confidence Grade

We note that Scottish Water has reported confidence grades of:

- A2 for numbers, volumes and loads discharged;
- A1 for tariffs; and,
- A2 for revenue.

We believe that the assessment is reasonable.

Appendix A

The Reporter's team

APPENDIX A: THE REPORTER'S TEAM

General

The Annual Return 2007 has been audited and reported on by an Independent Reporter. Mr D Arnell, a Technical Director of Black & Veatch (B&V), is the appointed Independent Reporter for Scottish Water.

For this submission the Reporter was assisted in his work by a team of experienced engineers. The organisation, structure and personnel used by the audit team are described below.

Organisation and Structure

The organisation and structure of the Reporter's team for the audit of this Submission is set out on Figure A.1.

Individual members of the audit team report directly to the Reporter. The Reporter has access to support services at Black & Veatch including administrative assistance, quality assurance procedures and specialist advice. The Reporter is responsible for links with external bodies including the Company, WIC, SEPA and DWQR. The Reporter also acts as a Independent Reporter in Wales and has access to other Reporters and regulators in England and Wales. The Reporter carried out audits on Levels of Service, the water balance and Security of Supply Index.

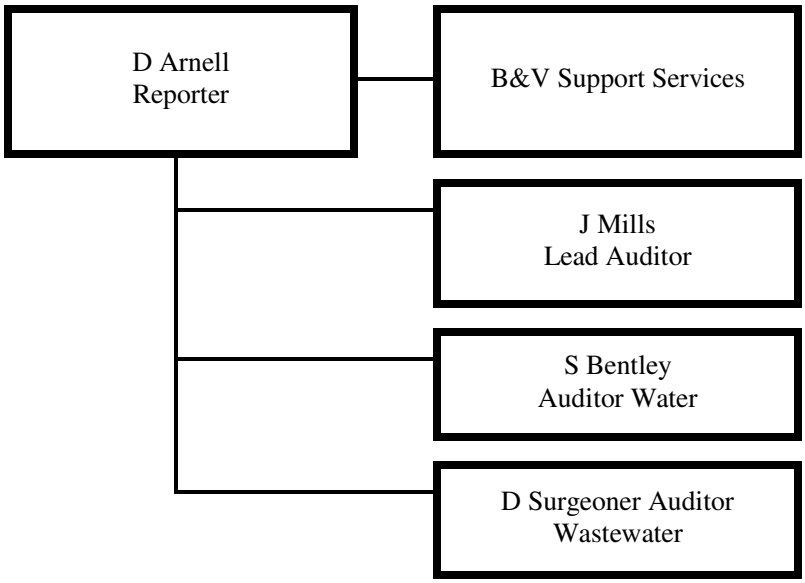


Figure A.1 Structure of the Reporter's Team

Personnel used by the Reporter

For this Submission the Reporter was assisted in his work by the following team:

Mr J Mills, Lead Auditor: Mr Mills is a Technical Director to Black & Veatch. Mr Mills reviewed work connected with the sewerage serviceability measures, sludge disposal, capital programme and operating costs.

Mr S Bentley: Mr Bentley is a Consultant with Black & Veatch. Mr Bentley undertook reviews on measured supplies, the asset inventory and the capital programme.

Ms D Surgeoner: Ms Surgeoner undertook reviews of asset related levels of service (water pressure, interruptions to supply and flooding) and sewerage outputs and explanatory factors and parts of the asset inventory.

The Reporter's team operates completely independently of the Company. Members of the Reporter's team are not engaged in consultancy studies or other service contracts associated in any way with the preparation of submissions for the Company during the period in which certification responsibilities are required.

Appendix B

Quality Assurance procedures

APPENDIX B Reporter's Quality Assurance procedures

General

In the Reporter's Protocol it is noted that the Reporter should annex the quality assurance procedures used in relation to certification of the Company's submission to his report. The applicable quality assurance procedures are outlined below and consist of the following:

- The relevant section of the quality assurance procedures of Black & Veatch;
- The current version of the Project Plan prepared under the quality assurance procedures of Black & Veatch which summarise information, the scope of work and procedures relating to reporting on the Company's submissions to WIC; and
- The audit plan for this Submission which was prepared and submitted to WICS and Scottish Water as required in the Reporter's Protocol

The Quality Assurance System of Black & Veatch

The work has been carried out under the Quality Assurance system of Black & Veatch.

Black & Veatch has an established Quality Assurance system certified by an accredited agency to meet the requirements of BS EN ISO 9001:2000 for the provision of consulting engineering services to the water industry and other sectors. The documentation of the system comprises a Quality Manual and a comprehensive set of procedures. Associated with these procedures are documents giving guidance on the application of the procedures to particular projects, thereby achieving a uniformly high standard of product by Black & Veatch.

Documentation and records relating to the Quality Assurance procedure may be inspected by arrangement at the offices of Black & Veatch.

The Project Plan

To focus the application of the Quality Assurance system for individual projects a Project Plan is prepared. The purpose of this plan is to define the objectives to be obtained in the execution of work in the project. The plan identifies the standard procedures that shall apply to the project and defines any special procedures that may be required. In addition, it gives details of the staff responsible for undertaking work on various aspects of the project including checks and reviews.

A project plan has been prepared relating to reporting of June Returns and a copy is available for inspection if required.

Appendix C

Specific documentation that supports the Reporter's report

APPENDIX C Documentation supporting the Reporter's report

The Reporter's team undertakes its work by means of meetings and reviews of supporting information provided by Scottish Water. This information may be reviewed at the time but some information is requested for later delivery. Information may either be in electronic or paper form. Handwritten meeting notes are taken at each meeting. These are not typed up.

All meeting notes and any supporting information in a paper form are filed in sectionalised lever arch files. These are available for inspection at any time.

Appendix D

Summary of meetings, inspections and audit trails

APPENDIX D Summary of meetings, inspections and audit trails

Date	Location	Personnel	Subject
160/4/07	Castle House	WB, GW, DA	DA/1: Table A2 Leakage
19/04/07	Fairmilehead Office	SH, CoN, EL	DA/2: Tables B4 & B7 Customer Services
20/04/07	Castle House	NA, SH, DA, SBr,	DA3: Table A1, Unmeasured non household numbers
20/04/07	Castle House	WB, DA	DA4: Table A2, Water balance
20/04/07	Castle House	AM, DA	DA5: Table E11, Employee numbers
20/04/07	Castle House	BM, DA	DA/6: New obligations
24/04/07	Castle House	WB, GW, DA	DA/7: Table A2, Water balance
25/04/07	Castle House	WIC, ARUP, SW Management, DA	DA/8: Leakage Seminar
25/04/07	Juniper House	OB, EH, DA	DA/9: Table B3, SOSI and water resource planning
26/04/07	Castle House	JR, DA	DA/10: Water supply zone populations
26/04/07	Juniper House	EH, DA	DA/11: Table B3, SOSI and water resource planning
08/05/07	Fairmilehead	JS, RL, CoN, DA	DA/12: Tables B4 & B7 Customer Services
09/05/07	Fairmilehead	DM, DA	DA/13: Tables B4 and B7, Business Stream
09/05/04	Castle House	CoN, SBr, DA	DA/14: Tables B4 & B7 Customer Services
09/05/07	Castle House	MS, DA	DA/15: Table B7, Accounts Payable
10/05/07	Castle House	DF, DA	DA/16: E tables, ABM, SW contracting allocation
10/05/07	Blantyre Depot	NM, JC, DA	DA/17: ABM, E tables, SW contracting allocation
10/05/07	Castle House	PH, DA	DA/18: E & G tables, Infrastructure renewals charge
11/05/07	Castle House	PH, MM, MH, DA	DA/19: Tables G5 & 6, Investment plan risk items
18/04/07	Castle House	SB, SH, CoN, NA	SB/1: Tables A1, P3, P4, P7 & P8, Measured properties
19/04/07	Castle House	SB, RM, GM	SB/2 Table B8, Mains bursts per 1000 km
19/04/07	Castle House	SB, MB, JR	SB/3 Table B8, WTW Turbidity
19/04/07	Castle House	SB, RM, AW, RHG, BD	SB/4 Table B8, Mains bursts per 1000 km
20/04/07	Castle House	SB, DA, SHe, NA	SB/5 Tables A1, P3 & P7, Numbers of non-household properties, Oxera report
20/04/07	Castle House	SB, CoN, NA, IR, SHe	SB/6 Table A1, Number of properties connected in the year
20/04/07	Castle House	SB, CoN, JR,	SB/7, Table A2, metered and non-potable volumes
14/05/07	Leven House	SB, SC, AG, DC, SBo, JC	SB/8, Table G5 & G6, audit of capital projects
14/05/07	Leven House	SB, AG, BMa, JC, SC	SB/9, Table G5 & G6, audit of capital projects
14/05/07	Leven House	SB, AG, JC, SC	SB/10, Table G5 & G6, audit of capital projects
14/05/07	Leven House	SB, AC, SL	SB/11, Table G5 & G6, audit of capital projects
14/05/07	Leven House	SB, JMcL, MQ,JMcK	SB/12, Table G5 & G6, audit of capital projects
15/05/07	Torridon House	SB, AC, SG, KS, AMcL, LC	SB/13, Table G5 & G6, audit of capital projects

Date	Location	Personnel	Subject
15/05/07	Torridon House	SB, GL, GU, MD	SB/14, Table G5 & G6, audit of capital projects
16/05/07	Watermark House	SB, BS, PS, NB	SB/15, Table G5 & G6, audit of capital projects
16/05/07	Watermark House	SB, SM	SB/16, Table G5 & G6, audit of capital projects
16/05/07	Watermark House	SB, AW, DC, NB, MS	SB/17, Table G5 & G6, audit of capital projects
17/05/07	Watermark House	SB, AC, LC, SM	SB/18, Table G5 & G6, audit of capital projects
17/05/07	Watermark House	SB, AC, SR, MQ	SB/19, Table G5 & G6, audit of capital projects
17/05/07	Watermark House	SB, NM, NH, MS, LS	SB/20, Table G5 & G6, audit of capital projects
17/05/07	Watermark House	SB, SF, SC, LS, MS, BP, EP	SB/21, Table G5 & G6, audit of capital projects
18/05/07	Castle House	SB, JD, BM, MM	SB/22, Table G5 & G6, audit of capital projects
23/05/07	Castle House	SB, MH	SB/23, Table D5, audit of mains asset balance
23/05/07	Castle House	SB, JM, MH, IP	SB/24, Tables D7, D8, audit of wastewater and water capital maintenance expenditure
23/05/07	Castle House	SB, AW	SB/25, Table D5, audit of water resources planning - DMAs
23/05/07	Castle House	SB, RM	SB/26, Table D5, audit of mains asset balance
23/05/07	Castle House	SB, MP	SB/27, Table D5, audit of mains asset balance
24/05/07	Castle House	SB, MH, IP	SB/28, Tables D7, D8, audit of wastewater and water capital maintenance expenditure
24/05/07	Watermark House	SB, DC	SB/29, Table D5, audit of water resources planning - DMAs
29/05/07	Castle House	SB, AW, RHG, RP	SB/30, Tables E4, H1-3, audit of water assets – resources and treatment
29/05/07	Lomond House	SB, RHG, DS	SB/31, Tables E4, H1-3, audit of water assets – resources and treatment
29/05/07	Lomond House	SB, RHG, BD	SB/32, Tables E4, H1-3, audit of water assets – resources and treatment
29/05/07	Castle House	SB, HC	SB/33, Table E4, audit of water assets – resources and treatment
30/05/07	Castle House	SB, AW, RHG	SB/34, Tables E6, H1-3, audit of water assets – distribution
30/05/07	Castle House	SB, HC	SB/35, Table E6, audit of water assets – distribution
30/05/07	Lomond House	SB, RHG, BD	SB/36, Tables E6, H1-3, audit of water assets – distribution
30/05/07	Castle House	SB, RHG	SB/37, Tables E6, H1-3, audit of water assets – distribution
31/05/07	Castle House	SB, RHG, PD	SB/38, Table E6, audit of number of supply zones
31/05/07	Castle House	SB, RM, GB	SB/39, Table E6, audit of number of supply zones
31/05/07	Castle House	SB, RHG, PD	SB/40, Tables E6-7, H1-2, H5, audit of pumping stations
31/05/07	Castle House	SB, SH	SB/41 E & H Tables, audit of Ellipse updating
31/05/07	Castle House	SB, CoN	SB/42, P Tables, audit of connection sizes and meter data
31/05/07	Castle House	SB, CoN	SB/43 Tables A1-2, audit of measured non-domestic quantities
01/06/07	Castle House	SB, RP, AH	SB/44, Tables E11, H1, H6, audit of M&G

Date	Location	Personnel	Subject
06/04/07	Castle House	DS, AD, MR, NA, IP, DF	DS/01 : Audit 18 Table B2 Interruptions To Supply
17/04/07	Castle House	DS, IP	DS/02 : Audit 19 Table B3, B3a Sewage Flooding Incidents
17/04/07	Castle House	DS, AM, NA, ST	DS/03 : Audit 20 Table B3, B3a At Risk Register
18/04/07	Castle House	DS, MW, RM	DS/04 : Audit 28 Table B8 Other service indicators - sewerage service - sewer collapses and failures, blockage
23/04/07	Riverside House, Dundee	DS, CC, SF	DS/05 : Audit 01 Tables A1, P1, P3, P5, E6 Ummeasured domestic properties
23/04/07	Riverside House, Dundee	DS, CC, SF	DS/06 : Audit 12 Tables A2 Volume Ummeasured domestic sewage
24/04/07	Riverside House, Dundee	DS, CC, GS	DS/07 : Audit 6 Tables A2, E6, E7 Population numbers
24/04/07	Riverside House, Dundee	DS, MB	DS/08 Licensed Standpipes follow up meeting for DA
26/04/07	Castle House	DS, MP, AM	DS/09 : Audit 17 Table B2 Properties Receiving Pressure below Reference Level
27/04/07	Castle House	DS, AMc	DS/10 : Audit 29 Table B8 Other service indicators - intermittent discharges (lines 12 & 13)
27/04/07	Castle House	DS, DM	DS/11 : Audit 13 Table B4 Septic tank and other tanker loads/volumes
08/05/07	Castle House	DS, AW, RM, MH	DS/12 : Audits 36 &37 Table D6 Critical Sewer, CCTV Survey, sewer balance
15/05/07	Castle House	DS, DMc, GS	DS/13 : Audit 14 Tables A2 E10 Sewage Loads
17/05/07	Balmore Rd, Glasgow	DS, KM, IP	DS/14 : Audit 19 Table B3, B3a Sewage Flooding Incidents
18/05/07	Balmore Rd, Glasgow	DS, AD, IR, RP, MA	DS/15 : Audit 66 Table G8 Review of development constraints (including infrastructure charge and SW contributions)
22/05/07	Castle House	DS, GS	DS/16 : Audit 38 Table D6 Studies
22/05/07	Castle House	DS, GS	DS/17 : Audit 50, 51, 53, 54 Table E7 E8 E9 H1, H4 H5 Asset Data Sewerage, Wastewater Treatment and wastewater treatment works
23/05/07	Castle House	DS, GS, AW, RM	DS/18 : Audit 50, 51, 53, 54 Table E7 E8 E9 H1, H4 H5 Asset Data Sewerage, Wastewater Treatment and wastewater treatment works
24/05/07	Biwater Offices, Livingston	DS, AW, RM, DS, D, V, IS	DS/19 : Audit 50, 51, 53, 54 Table E7 E8 E9 H1, H4 H5 Asset Data Sewerage, Wastewater Treatment and wastewater treatment works
05/06/07	Balmore Rd, Glasgow	DS, CF	DS/20 : Audits 36 &37 Table D6 Critical Sewer, CCTV Survey, sewer balance
05/06/07	Balmore Rd, Glasgow	DS, AMcD	DS/21 : Audit 13 Table B4 Septic tank and other tanker loads/volumes
04/04/07	Redhill	NA, BMcG, RD, PD, DA, JM	JM/01 : AR07 Briefing and planning meeting
04/04/07	Redhill	JM	JM/02 : Analysis of interruptions spreadsheet
24/04/07	Castle House, Dunfermline	RS, JM	JM/03 : Audit of trade effluent data
25/04/07	Castle House, Dunfermline	CoN, SH, JM	JM/04 : Audit of surface area charges
25/04/07	Castle House, Dunfermline	DM, GS, JM	JM/05 : Audit for sludge disposal quantities
25/04/07	Castle House, Dunfermline	DM, GS, JM	JM/06 : Audit of septic tank wastes
26/04/07	Castle House, Dunfermline	MC, SW, JM	JM/07 : Audit of sewage treatment works performance measures

Date	Location	Personnel	Subject
27/04/07	Castle House, Dunfermline	RP, JM	JM/08 : Audit of sewerage equipment failure numbers
27/04/07	Castle House, Dunfermline	JM	JM/09 : Review of capital programme data.
08/05/07	Castle House, Dunfermline	DM, KD, JBM	JM/10 : Audit of UID Strategic studies
08/05/07	Castle House, Dunfermline	ST, JM	JM/11 : Review of ABM processes
09/05/07	Torridon House, Inverness	KH, JM	JM/12 : ABM allocation audit - NW networks
10/05/07	Castle House, Dunfermline	DF, GY,	JM/13 : PPP Audit – table E3
10/05/07	Castle House, Dunfermline	DF, GY	JM/14: PPP Audit – table E3a
15/05/07	Castle House, Dunfermline	MH, JM	JM/15 : Audit of tables G5 and G6
16/05/07	Watermark Ho. Livingston	NB, DB, SC, DB, JM	JM/16 : sub-programme audit – Q&S2 WIC16 programme
16/05/07	Castle House, Dunfermline	DM, SJ, JM	JM/17 : UID Strategic Study management
17/05/07	Castle House, Dunfermline	RB, JM	JM/18 : sub-programme audit – Q&S3 water quality programme
18/05/07	Castle House, Dunfermline	DP, IS, DM, DL	JM/19 : Sludge disposal quantities and compliance
18/05/07	Castle House, Dunfermline	Ad, DW, AMcC JM	JM/20 : sub-programme audit – Q&S3 sewer flooding programme
18/05/07	Castle House, Dunfermline	Ad, DW, JM	JM/20 : sub-programme audit – Q&S3 wastewater infrastructure
21/05/07	Bullion House, Dundee	LC, SC, DF, JM	JM/22 : ABM allocation audit – NE Water Production
21/05/07	Bullion House, Dundee	DF, JM	JM/23 : ABM allocation audit – central allocation of cost and time to activities
21/05/07	Bullion House, Dundee	DF, JM	JM/24 : ABM allocation audit – fleet recharge drvier
22/05/07	Castle House, Dunfermline	DP, JM	JM/25 : sub-programme audit – Q&S3 – odour programme
22/05/07	Castle House, Dunfermline	DP, JM	JM/26 : sub-programme audit – Q&S3 – wastewater backlog quality
22/05/07	Castle House, Dunfermline	DP, JM	JM/27 : sub-programme audit – Q&S3 – wastewater quality
22/05/07	Castle House, Dunfermline	DP, JM	JM/28 : sub-programme audit – Q&S3 – first time sewerage provision
22/05/07	Castle House, Dunfermline	DP, JM	JM/29 : sub-programme audit – Q&S3 – landfill and IPPC
22/05/07	Balmore Road, Glasgow	LB, JM	JM/30 : project audit – NE developer services
22/05/07	Balmore Road, Glasgow	MS, NB, JM	JM/31 : Q&S2 project sign off
22/05/07	Balmore Road, Glasgow	KD, JM	JM/32 : UID holding line budget
23/05/07	Castle House, Dunfermline	KM, JM	JM/33 : Q&S3 3rd party issues management
23/05/07	Castle House, Dunfermline	MH, IP, SB, JM	JM/34 : Capital maintenance cost allocation, tables B7 and B8.
23/05/07	Castle House, Dunfermline	MP, JM	JM/35 : sub-programme audit – Q&S3 – water infrastructure maintenance
23/05/07	Castle House, Dunfermline	NB, BMcA	JM/36 : sub-programme audit – Q&S3 –non-infrastructure maintenance
23/05/07	Castle House, Dunfermline	NB, JM	JM/37 : Q&S3 project sign off process
23/05/07	Castle House, Dunfermline	MH, JM	JM/38 : tables G1 to G4
23/05/07	Castle House, Dunfermline	MH, JM	JM/39 : tables D1 to G3, methodology

Date	Location	Personnel	Subject
24/05/07	Castle House, Dunfermline	MM, JM	JM/40 : Calculation of holding line cost forecasts
24/05/07	Castle House, Dunfermline	ST, DF, JM	JM/41 : ABM analysis to E tables
01/07/07	BV offices, Redhill	JM	JM/42 : Confirmation of tariffs in the P tables

Appendix E

Summary of time and costs

APPENDIX E Breakdown of time and costs

The breakdown of the estimated time spent by the Reporter and his team for the Annual Return 2007 only is shown in the table below:

Reporter/Team Member	Time spent (Hours)
D Arnell	277.5
J Mills	301.5
S Bentley	231.0
D Surgeoner	234.5
Total	1044.5

The figures quoted above relate to actual time expended to the 6th July 2007. The figures exclude any work undertaken answering queries.

The costs of undertaking the work are given in our letter of transmittal.

Appendix F

Areas of concern and challenge

APPENDIX F Areas of concern and challenge

In this Appendix we describe some of the challenges we made to the Company while it compiled the information for its Annual Return.

Table A1

In accordance with specific guidance from WICS, Scottish Water was challenged to explain the difference between its own estimate of the total number of measured and unmeasured non-household properties for AR07 of 128,386 (lines A1.3 + A1.4) and the OXERA view that, based on comparisons with England and Wales, the number of billed non-household customers is likely to be in the range 135,000 to 150,000, with a most probable estimate (based on Inter Departmental Business Register data) being 141,000. Scottish Water noted that it is starting a project to sample-check representative areas of Scotland and extrapolate the data found to make their own estimate of total non-households for comparison with the OXERA figure. Scottish Water stated that at present it was not able to explain the difference between its own (bottom-up) figure and the (top-down) OXERA figure.

We are concerned that split of Scottish Water and the Scottish Water Business Stream will make the auditing of properties, flows and levels of service indicators more difficult. We recommend that WIC considers how it wishes to proceed with auditing these figures in future years.

Table A2

In the initial version of Table A2 seen during the audit, projections for growth reflected the assumptions given in the Scottish Water Delivery Plan published in May 2006, namely 2000 un-measured non-domestic customers moving to measured (line A1.8) and 500 new measured non-domestic customers (line A1.9). Despite these movements no growth was forecast from 2006-7 to 2007-8 at line A2.14. We challenged Scottish Water about this and Scottish Water reviewed the figures and incorporated the figures in the growth forecasts.

We challenged Scottish Water on its changes to its unmeasured domestic PCC. We reviewed the basis of the calculation and the data from the 3 companies that had been used to generate the new figure. We accepted that the calculations were reasonable but noted that if other companies had been used a different answer would have been generated. We accepted that the 3 companies were representative of the north and west of Great Britain. We noted that Scottish Water was developing a more robust PCC monitor, which should result in a more robust estimate for AR08.

We challenged Scottish Water on its revised calculation for unmeasured non-household consumption. We reviewed the data presented and concluded that the answer was likely to be more robust than the previous calculation. We also noted that Scottish Water was undertaking a metering programme and better results were likely next year.

The non-household sewage loads have been miscalculated and are lower than the actual values by a factor of 1000. This impacts on the total load calculated within the table. We understand that Scottish Water intends to resubmit the table.

The report of sewage loads does not include a small element of sludge loads which Scottish Water includes in the treatment works loads reported in the E tables.

We recommend that Scottish Water confirms the position regarding waste management records of transfers of sludge between Scottish Water and PPP treatment facilities with the relevant regulators.

Table B2

We challenged Scottish Water on the fact that low pressure complaints were not recorded on the current low pressure register. There are likely to be significant numbers of low pressure on individual households where low pressure is caused by faulty communication pipes or stop taps. We believe that these should be recorded and removed when the problem has been fixed. A new register is currently being populated by Scottish Water.

We also were concerned that due to the inadequacies of the register, data provided to support the additions and removals from it did not always reconcile to the number and location of properties added or removed.

We discussed with the Company reasons why operatives record start and finish times of interruptions to the nearest half hour. We remain concerned that this might inadvertently bias the results and suggest that Scottish Water gives additional training to its operatives on the need to record times accurately.

We challenged Scottish Water on an error in the interruptions spreadsheet. Scottish Water accepted that there had been an error and corrected it.

We challenged Scottish Water on inconsistencies in the categorisation of data on Promise and Datamart for interruptions. Scottish Water noted the inconsistencies and agreed to review reasons why they might have occurred.

Table B3 and 3a

We noted that there was significant missing information in flooding incident resolution codes and choke forms which led to assumptions regarding data having to be made. Scottish Water stated that it plans to address this with a more widespread use of handheld devices. We also noted that SW is not reporting like for like from year to year regarding main sewers and laterals.

In the at risk register we were concerned that the at risk numbers still contained a significant amount of "default" figures covering data that has not been confirmed. We also noted that not all data from the customer survey has been entered the register. Scottish Water responded that improvements were planned over the current year.

We challenged Scottish Water on inconsistencies in the categorisation of data on Promise and Datamart for interruptions. Scottish Water noted the inconsistencies and agreed to review reasons why they might have occurred.

Table B4

We noted that 4 separate staff produce the figures for private septic tank emptying. Some produce the figures by counting paper records, and others by carrying out queries on Gemini and also checking paper records. We recommended that all staff are provided with the facilities to use Gemini to produce the data for the annual return.

We noted that in the Scottish Water Business Stream report (Column 2) the total number of billing, charging and metering enquiries at 58740 (Line 1) significantly exceeds the total number of telephone contacts at 41,777. While this may indicate the large number of written contacts received we remain concerned over the difference. We did not audit these Business Stream figures as we could have for Scottish Water.

We challenged the Company as to why lines B4.15 and B4.15a had the same draft entries. Scottish Water accepted that they should be different and added "linked" contacts to the previous total in Line B4.15a.

We challenged the Scottish Water Business Stream over the very low number of telephone complaints returned under Line B4.29. We were informed by Scottish Water Business Stream that while there is a complaint code, operators are not instructed to use it. Complaints are escalated to team leaders who either deal with it at the time or encourages the customer to put their complaint in writing. This is not the case in Scottish Water where Promise operators are instructed to log telephone complaints.

Hi Affinity has always been used as an internal job management system as well as a customer contact system. Last year Scottish Water found that a number of these "internal" contacts had been wrongly coded to external contacts and hence included in the return. In the light of this, this year we challenged Business Stream in the continuing use of Hi Affinity for this purpose. Business Stream was able to assure us that it held regular random quality assurance checks which checked this. It had also undertaken further staff training. Finally, consideration was being given to commissioning a separate job management system to ensure that there would be no recurrence in the future. We accepted that last year's problems were unlikely to have re-occurred this year.

Table B8

We challenged Scottish Water to explain the difference between the 317 WTWs reported at line B8.8 and the Drinking Water Quality Report figure of 320. Scottish Water clarified that the figure at line B8.8 relates to sites where turbidity samples were taken in the year, while the DWQR figure is the number of sites operational in the year. WIC methodology excludes sites where few samples are taken in the year.

Mains bursts are recorded on WAMS. In addition to size bands for repairs there are codes for 'repair burst main' and 'repair burst main large diameter' where diameter is unspecified. Scottish Water accepted that this could lead to some inaccuracy, but stated that the numbers coded in this way were small and the use of these codes had now been discontinued. This was accepted.

Reported sewerage service equipment failures include equipment failures at sewage treatment works. We understand that these are excluded from similar reports in England and Wales. All equipment failures are reported. We understand that similar reports in England and Wales are limited to failures which caused or had a significant risk of service failure. We recommend that the line definition is reviewed. If the data is to be compared with data from England and Wales, we recommend that consistent line definitions are adopted.

We worked with Scottish Water to review the calculation of sewage treatment works performance. Scottish Water sought further explanation from WICS to confirm the reporting requirements.

Table B9

We challenged the Company as to why it had not included a dry year factor in its distribution input estimate. It acknowledged that it was an error and altered its figure.

We challenged the Company on the operational losses at water treatment works. The Company submitted lists of actual losses in support of its figures. We noted one or two outliers and recommended that the Company reviews the reasons for the particular results and considers omitting them from its final calculations for the 2008 water resource plans.

Tables D5, D6

In the initial version of Table D5 seen during the audit, a reconciliation of lines 1 to 8 showed that the length renewed (Line 2) had been added to the total of new mains to give the total shown at Line 8, without deducting the length of mains replaced by the renewed mains. This appears to have been the practice in previous Annual Returns and appeared to result in an overstatement of the length of new mains. Scottish Water produced a revised version of Table D which enabled Lines D5.1 – D5.8 to be reconciled. The revision gives a more consistent statement of the length of mains abandoned. We note that this revision should be applied to sewers in Table D6 as well.

Table D5

In the initial version of Table D5 we challenged Scottish Water on the number of lead services reported replaced at line D5.10. Scottish Water accepted that a number of lead services replaced as part of the rehabilitation programme had been omitted in error and amended the return.

Scottish Water was challenged to explain why, when the number of properties is used as a surrogate for population at line D5.16, the line 16 figure is smaller than line D5.17. As some properties share connections the opposite would be expected to be the case. Scottish Water responded that its approach applied a rule-based approach which allots numbers of connections to groups of stacked properties. This approach was based on surveys carried out by East of Scotland Water under the INMS programme and is covered by Technical Guidance

Note WIC/TGN/H3_07. Although Line 17 is bigger (73%) than Line 16 (71%) Scottish Water pointed out that the difference is within the spread which could be expected within the accuracy levels of the allotted confidence grades.

Table D6

We noted that drainage area studies completed includes studies which are completed to Scoping stage only and were not carried on to the Needs and Options stage.

Tables D7, D8

Scottish Water was challenged to explain why some projects which appeared to be site-specific (based on project name) were allocated to the Scottish Water-wide categories in building up the table lines, with their costs distributed across all areas. Scottish Water explained that Tables D7 and D8 were new for AR 07 and that guidance on coverage had been received late, limiting the time for analysis. It was hoped to address these issues for AR 08.

Table E1 and E2

We note the differences between the output from ABM allocation of expenditure and the financial accounts for issues including capitalisation, PPP support costs, support costs for Scottish Water Solutions. We note that the financial accounting cost allocation is reported in the E tables for these issues and any difference reallocated across other cost categories.

Table E3

During our audit we noted that the data used to calculate treatment works compliance was restricted to six months data. The final calculations are based on 9 months data only, covering the period from the introduction of CAR licences in April 2006 to the end of the calendar year.

We challenged classification of sewers and the inclusion of inter-stage pumping in the asset report. The company amended its report. We noted the work by the company to provide a consistent and robust report on assets.

We noted that some costs included in the OPEX accounts are direct payments towards PPP capital assets. Under a direct procurement route these costs might be capitalised and depreciated.

We are concerned that we have not been able to verify whether the reported capital costs of the PPP plant are actual costs. The costs have been inflated by RPI as opposed to COPI to reflect construction cost increases. We recommend that these uncertainties are taken account of in any assessment of the current efficiency of PPP concessions.

We are concerned that one PPP treatment plant has been a failing woks in two consecutive years.

Table E6

Scottish Water was challenged to explain why the number of supply zones reported in AR 06 differed from the figure reported in the 2006 Drinking Water Quality Report. Scottish Water confirmed that the AR 06 figure was the figure for the 2005 calendar year. IN AR07 the company has reported the figure for the 2008 calendar year.

Table E8

We noted a discrepancy between the Table A2 figure for trade effluent and that in the E Tables. Scottish Water accepted that an error had been made and corrected it.

We note the theoretical difference between the distribution pumping head estimate and the cost of pumping. We recommend that Scottish Water reviews this comparison for individual pumping stations to understand and explain the difference.

Table E10

During our audit we challenged differences in the methodology for estimating sludge quantities from previous years and worked with the company to ensure consistency of approach.

We challenged the reduction in sludge quantities in the report year and explored reasons for the change with the company. We recommend that the company continues to review material differences between measured and theoretical quantities of sludge production and seeks to understand any significant differences.

In our review of the final submission we noted that the resident population served does not relate to the sludge quantity disposed of. We recommend that the figures should be reviewed and aligned with the sludge quantity.

We note that the equivalent report of sludge quantities in England and Wales now includes quantities of grit and screenings. We recommend that this is considered in any comparative analysis undertaken.

Tables G1 to G6

During our audits of the Q&S2 completion programme we noted a number of Q&S2 completion projects where major risks remain which might further delay completion and increase costs above that reported in table G5. Scottish Water includes a risk item against potential cost escalation. In the CIR the company included an adjustment item which moved

forecast expenditure to subsequent years to account for the risk of further delay. This adjustment was not included in table G5.

Table G5 includes a residual value in the Environmental Quality Parking Lot for the completion of improvements to discharges to Loch Ryan. The allowance will not cover the current estimated costs of completing the project. There is no allowance for funding in Q&S3 (table G6) for the estimated balance of expenditure required to complete the work.

We were concerned by the number and value of schemes which must pass through the CAPEX3 approvals stage during the summer of 2007 to allow the company to deliver the forecast spend in 2007-08 and provide a sound base for programme delivery in subsequent years. In response the company noted that this had been identified as a key issue and action plans had been put in place to manage projects through the approvals stage. During our audits we saw evidence of these actions plans and the commitment to meeting approvals dates. We remain concerned that this is a key risk to progress on the capital programme.

During our audit of the Q&S3 projects we noted projects where project managers were aware of key items which could have a material impact of project cost and completion date. These risks are generally external 3rd party risks such as land acquisition, planning permission, confirming SEPA requirements, proving new raw water sources, impact of external stakeholders and addressing environmental constraints. Some allowance is made for these major issues in project risk registers. In addition, Scottish Water includes a separate risk allowance in its programme to account for these risks.

The 3rd party issues identified above were a key cause of project delay and cost escalation in Q&S2. We challenged Scottish Water on the management of these issues in Q&S3. Scottish Water noted that it had established centrally managed teams of specialists aligned with project teams to identify and manage 3rd party issues. Central reporting systems are in place to monitor 3rd party issues. Progress is reviewed by senior managers to ensure that every effort is made to manage these risks. We concluded that a reasonable process is in place to minimise the impact of 3rd party issues. However, it is likely that some risks will materialise and we recommend that Scottish Water develops its formal assessment of the impact of this for the risk funds and other adjustments included in its returns to WICS.

We note that a significant part of the capital programme is reported in sub-programme holding lines while the detailed programme of work is developed. We noted instances were detailed development work already suggest that costs will exceed those reported in some holding lines. Scottish Water responded that it did not wish to adjust sub-programme budgets until it had a clear understanding of the sub-programme as a whole.

We note that the CAPEX5 date for Q&S3 will include sign-off by the relevant quality regulator if appropriate. We are concerned that the current project estimates do not allow sufficient time between completion of the project and sign-off by the quality regulators. If this is the case, we expect CAPEX5 dates to be delayed without any real underlying difference in programme delivery.

We note that the company is forecasting a Q&S3a overhang of expenditure into Q&S3b. Based on the current development of the programme and the significant project risks remaining, we believe that this is reasonable. We are concerned that there may be further growth in the value of the overhang as projects are progressed and risks materialise. Despite the forecast expenditure overhang, Scottish Water forecasts that all outputs will be delivered

by March 2010. The company believes that it is too early to forecast any changes to outputs while the programme continues to develop. We believe that rapid progress is needed through the approvals process if all outputs are to be achieved by the target dates. We note the action plans in place to ensure projects pass through the approvals system and the process in place to manage and mitigate 3rd party issues.

Table G8

We were concerned that projects to release strategic capacity in the report year will have beneficial use dates as late as June 2008. Scottish Water is reporting strategic capacity as released when upgrades are committed, in some cases accepting the risk of developments being complete before the upgrade work is complete.

H tables (general)

We noted that although the risk grading and financial impact grading had been dropped from the tables they were still used by Scottish Water when allocating EARCs to future replacement bandings. This leads to significant swings between years and anomalies between condition and performance grades and immediate spending needs. Scottish Water believes that the method gave anomalous answers and that the reporting requirements should be reviewed, a point that we agree with.

We noted that, as in previous years, the EARC valuation was calculated using cost equations which were developed from a small sample of sites which were valued for the 2003/2004 Annual Return. A different sample of sites would have led to different cost equations which could have a significant impact on the EARC valuation.

Table H2

We note that the methodology adopted by Scottish Water for estimating EARC depends on the works "type". This results in a significant change in EARC of water treatment works in the report year due to changes or clarification of the definition of works type which does not relate to any real change in the asset base. We recommend that this is considered as Scottish Water develops its modern equivalent asset valuation.

Table H3

Scottish Water was challenged to explain why almost all lengths of aqueduct were graded condition grade 3 and performance grade 3. Scottish Water explained that these were estimated grades, reflecting incomplete asset knowledge. It was a matter of some concern that asset knowledge on these key assets was not better and it was hoped to improve this situation for future returns.

Table H4

We noted that there are two methods of determining whether or not a sewer was deemed critical in this return. Those deemed critical as per AR06 remained so, but any new sewers which were added to the inventory were deemed critical by their depth material and size only.

Table H5

Scottish Water was challenged to explain why the gross EARC for water pumping stations had significantly reduced from AR 06 to AR 07. Scottish Water explained that the number of pumping stations had reduced by 14 and the total assessed design capacity had reduced considerably due to better information from site surveys.

Scottish Water was challenged to explain why the gross EARC for wastewater pumping stations had increased by less than COPI from AR 06 to AR 07. Scottish Water explained that the total assessed design capacity had reduced considerably due to better information from site surveys.

Table H6

Scottish Water was challenged to explain the very large drop in net EARC given at line H6.6 for IS, when comparing AR 06 and AR 07. Scottish Water reported that the AR 07 figure was a realistic one, reflecting the fact that most IS assets were almost life-expired. The AR 06 figure had probably been an overstatement.

Tables P3, P4, P7, P8

Scottish Water was challenged to show that data reported in P tables for measured properties is an accurate analysis of data held in Hi Affinity. By direct access to data downloaded from Hi Affinity at the end of September 2006, using the Business Objects tool the analysis was audited on a sample basis and seen to produce an accurate representation.

General

We note a number of areas where different approaches have been taken to reporting data in consecutive years which make it difficult to reconcile and explain changes year on year. We suggest that Scottish Water and WICS agree a consistent methodology for future years for the following:

Whether the number of trade effluent properties is the number of connected properties, the number of consented discharges or the number of customers using the discharge in the year.

Whether trade effluent loads and sewerage loads and sludge quantities should include or exclude those treated at PPP works.

Whether the effluent consents and compliance data reported in tables E3, E8 and E9 should include the UWWTD requirements of the consents.

Whether the number of water supply zones should be reported for the calendar year at the start or the end of the report year.