WATER INDUSTRY COMMISSION for SCOTLAND

## Reporter Services

# Annual Return 2007-08
# Reporter's Report

July 2008

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# SCOTTISH WATER'S
# ANNUAL RETURN 2007-08
# 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 2007-08 (AR08).

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 2008 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. This year the Reporter was asked to address the Audit Committee during its meeting on the Annual Return. This included a discussion with the non-executive directors without the presence of the executive directors.

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 2006/7 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. The technical reviewer is usually a part of the central IDR team and does not necessarily have the desirable technical knowledge. However, we acknowledge that often an enquiring mind and the willingness to apply "sense checks" is worth more than technical knowledge.

- 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.

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 very positive step that since 2007 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.

We believe that a requirement for line and table owners together with reviewers to formally "sign off" their work imposes a useful discipline and consider that Scottish Water should consider implementing such a process.

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 or data entry 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.

In 2007 a number of improvements were made to the process. These were generally followed again this year. Of particular benefit was the early agreement on specific dates for the main audits. 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 and caused some uncertainty when we saw final tables.

The fact that the Annual Return and the Price Review were running in parallel made our work more difficult this year but this was to be expected.

We conclude that the process this year went relatively smoothly. We would have liked to have seen some items in a more complete form at our initial audits and where it was not possible updates automatically copied to us. We will discuss with Scottish Water how this area of the work could be improved for next year.

Difficulty remains in the 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 248, an 8% 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 note that in most areas Scottish Water now has the infrastructure it needs in place such that it can drive further improvements using a less stressed process than in the past. We believe that this is a very pleasing development.

During the report year Scottish Water has continued to improve its data capture from its operating staff. We have noted the efforts that are being made to ensure that data capture is both timely and accurate. Things are still not perfect and continual effort will always be required. However, we believe that through its IDR Group, Scottish Water has the right management structure in place to ensure that continuous improvement will be maintained.

As a member of the Regulatory Leakage Group the Reporter has seen the progress made by Scottish Water in the reporting year in installing its DMAs, setting up its unmeasured domestic consumption monitor and setting up its leakage control organisation. There were some delays, but overall very significant progress was made in the year. The current position is that Scottish Water now has all the infrastructure in place to undertake effective leakage control and to properly understand its water balance. We believe that for AR09 Scottish Water will be able to reconcile its top down and bottom up water balance and better understand the practical levels of leakage that it is likely to achieve for a given amount of effort. This should allow regulators to set future leakage targets on a more robust basis.

This year Scottish Water missed its leakage target with a "actual" leakage reduction of around 45 Mld (The headline figure was more but in part resulted from a revised estimate of minor components in its water balance, possibly indicating that its originally assumed leakage was not necessarily all leakage). This reduction, while disappointing, has to be judged against Scottish Water's only partially completed infrastructure. Given the fact that there is now a more robust infrastructure in place Scottish Water should be able to exceed this saving in the current year.

Since the Wholesale/Retail split Scottish Water no longer has instant access to some data that it needs to effectively run its business. We hope that the new organisations will rapidly learn to work productively together.

**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. We note that a number of works, while not failing the PCV, had higher turbidity levels than might now be expected in England and Wales. This is a useful general indicator for WTW operations.

The Company had 30 failing wastewater treatment works at the end of the report year compared with target for the year of no more than 39. Last year there were 47 failing works. This is a pleasing result, particularly as the Company has worked hard in this area. 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 99% complete on the Q&SII programme and 46% complete on its Q&S3a programme against a target of 33%. This give some confidence that Scottish Water is better placed to complete its Q&S3a programme compared to its Q&S2 programme, although it is currently forecasting a £102M overhang after April 2010.

A part of good programme management is effective risk management. During our audits this year we noted that Scottish Water had appointed a risk manager and was keeping more effective risk registers than we had noted in previous audits. We believe that enhancements such as these are indicative of Scottish Water's increasing ability to manage a very large capital programme.

**Key supporting information**

*Water resources, supply and demand and Security of Supply Index*

Scottish Water reports its security of supply index for the second time this year. The results show that only 56% 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. In its main narrative Scottish Water states that it believes that only around 15% 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 immediate future. We believe that Scottish Water's view is sensible.

As a result of our audit we noted that some parameters used in the supply demand balance calculation remain uncertain with further work required to improve the result. In particular Scottish Water has yet to finalise its Long Run Economic Level of leakage, a necessary part of obtaining a robust supply demand balance appraisal.

*Asset revaluation*

In its narrative Scottish Water gives details of its revised asset valuation.

We audited Scottish Water's work and while we noted some inaccuracies remaining in the base data we consider that the new valuation is significantly better than previous valuations. Over time we would like to see Scottish Water minimise the inaccuracies and set in place an effective system to ensure that it remains up to date.

*Climate change and carbon footprint*

We note that Scottish Water is actively looking at how it can minimise its emissions. It has also calculated its carbon footprint. We consider that this is sensible. Regulation in England and Wales is beginning to drive companies to innovate in these areas and it is to Scottish Water's advantage not to be left behind in what we believe will be a rapidly developing area.

**Sustainable procurement**

Scottish Water states that it is well advanced in developing its delivery model for the 2010-2014 period. Only very outline details are given and much of the effectiveness of sustainable procurement comes in the contractual details, on which we cannot yet comment.

Scottish Water intends to continue developing frameworks for much of its procurement. This is now a well tried model and is effective provided that the details promote mutually supportive behaviour patterns.

# 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 methodology for compiling connection and billed property data for Table A1 and populations for Table A2, adjusting the forecasts for different data sources and reporting dates and for forecasting 'Year +1' is similar to methods used in previous annual returns.

We are please to recognise that Scottish Water has developed and executed a thorough and consistent methodology for compiling and reporting connected and billed properties and populations. There is consistency between the A tables and P tables and with numbers taken forward into the SR10 1st draft business plan submission.

Improvements to and confidence in the quality of the forecasts will develop as the data sources become more reliable and thereby Scottish Water will be able to reduce the extent of data extrapolation necessary to generate the line item numbers in the AR and SR. However there is still the underlying requirement for Scottish Water to derive the returns based on base figures provided from WIC4, Ctax Base and Central Market Agency sources.

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.
- The allocation of unmeasured domestic properties relies in part of the 2007 WIC4 returns from councils updated using growth figures which were calculated from the CTax base returns for 2004-05 and 2005-06 and GROS data for populations. For this return, Scottish Water has commented that the information in the current WIC4 allows the detailed breakdown of properties subject to discounts required to complete the P tables to be derived directly. This is because of changes in benefits and hence reporting second homes and long term empty properties.
- Measured non-domestic property information is abstracted from Business Stream's billing system, HiAffinity, which also provides data used to prepare the WIC 22 reports. Customer numbers are reported at September 2007 while the reported volumes cover all customers served in the report year. Although Scottish Water has had partial access to the database up to April 2008, in the future, data will be supplied through the Central Market Agency. Better information has therefore been obtained for this year, but there are concerns about the quality, completeness and timescale of data for future returns.
- There is a 0.08% difference in the population reported in table A2 for water delivered to unmeasured households and the number used for the water balance which represents about, 0.7 Ml/d, but there is still a difference of an additional 2.3 Ml/d delivered but not accounted for in the calculation for unmeasured households.

- The population difference results from the data used by the Water Balance Team being supplied in February 2008 before final changes and additional data had been incorporated into the population forecasting model. Minor population forecasting issues related to when data was passed between different teams were also identified during the SR10 audit. We would suggest that there be closer linkage between teams work, using common input and output data for different purposes to ensure that these minor discrepancies are eliminated.

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

- More than one trade effluent customer can occupy a billed property in a year. The numbers reported are the numbers of premises 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.

- 2007-08 is the last year that Scottish Water will produce figures in the current format using retail prices, because the Central Marketing Agency will take over Trade Effluent charging for 2008-09. SW will charge at wholesale rates to the Agency.

The sources of data and methodology are substantially the same for the A tables and the P tables. During the audit of both sets of tables, cross checks did not highlight any significant differences between draft line entries that would not be corrected for the return submission.

We believe that the resulting estimates are acceptable for the Table A1 Connected and Billed properties and Table A2 Population reported numbers.

## 4.2 Table A1: Base Information – Connected and Billed Properties

### Commentary by REPORTER

### Introduction

Scottish Water has used a consistent methodology for deriving population and household data and forecasting for both AR08 and SR10. The approach uses data from:

- General Registers Office for Scotland
- Household Projections for Scotland, 2004-based
- Household Estimates for Scotland, 2006
- 2004-based Population Projections for Scottish Areas: List of Tables
- Government Actuary's Department
- 2007 WIC 4 Report – Billing and Household data
- C-tax base reports, Growth rates 07 to 17

The base data for property counts used to derive the reported numbers are abstracted from third party databases and the Scottish Water corporate databases and extrapolated to represent the line description. Where appropriate base data are abstracted by Unitary Council areas and aggregated up into Water Resource Zones where more than one council area falls within the boundaries of Water Resource Zones.

For AR08 (the starting point for SR10 forecasts) domestic property data have been abstracted direct from WIC4 as at 30 September 2007. This is different to previous years because changes in discounts have been reliably reported in WIC4.

For AR08 (the starting point for SR10 forecasts) non-domestic property data have been abstracted direct from Business Stream's Hi-Affinity billing database as at 30 September 2007. However we understand that direct access to the Business Stream data will not be available in the future. In the future information may be provided by the Central Market Agency (CMA) but the source of the data has yet to be agreed. This could impact the accuracy of future returns and associated confidence grades.

The same methodology has been used for Year +1 and SR10 projections. The figures for Year + 1 are abstracted from household growth data from the General Registers Office for Scotland.

*Key points*

<u>Unmeasured properties</u>

- The method used to compile the 2008 return is similar to that used in the 2007 return. The Year +1 number of properties has been estimated by updating the 2007 WIC4 figures for total households using growth in the WIC4 information between 2004-05 and 2007-08.

- The number of void properties is taken from the Ctaxbase where they are described as unoccupied exemptions. "Other exemptions" in the Ctaxbase are reported in the exempt line. For the first time in this return, second homes and long term empty

properties are identified separately, the former now being reported within "unmeasured household billed properties".

- As commented above, Scottish Water has been able to collate the 2007 WIC4 data into the appropriate reporting line item. Total dwellings have been factored for Year +1 based on the proportional increase in Total Household.

- A new simplified benefit discount scheme is in operation with Full (25%) or Partial (up to 25%) discounts only.

- Unmeasured exempt households have reduced from 68,294 in AR07 to 59,162 for this return. There is a discrepancy between the Scottish Water Return and C-Tax base return of 1,246 that has not been reconciled, but since this represents less than 0.1% of the billed households, it is not considered significant.

Measured properties and unmeasured non households

- The source of the data on measured properties and unmeasured non-household properties is the Hi Affinity system. For AR08 and SR10 Scottish Water was given permission to have limited, time bound direct access to the system to abstract the data for this return (30 September 2007). From May 2008 Scottish Water no longer has access to the Business Stream database, HiAffinity. This may pose problems for Scottish Water for returns for future years in so far as the data supplied by third parties may not represent the information required for the return (quality, completeness and time frame). For example there are differences between Scottish Water's reported metered water usage and the quantities billed by Business Stream for the same period. Although this implies the different purposes for the reported numbers, one would expect reconciliation between measured and revenue quantities to be available to Scottish Water.

- The Ellipse system is now being used for the asset inventory for meters. We recommend that robust systems be developed to ensure that Ellipse and the CMA systems remain in alignment on an on going basis.

- Non-household billed and connected numbers have reduced by 3,114. The reduction is reported by Business Stream. Scottish Water has not been provided with an explanation for the reduction which represents 3.5% of the connections. One explanation may be continued cleansing of the data on HiAffinity (previously discussed in AR07 report), although we had understood that this had been completed in 2006/7.

- Non-household billed and connected numbers have not been projected for Year + 1 because the data has not been supplied by Business Stream. SW report that this was requested by WIC.

- There is no significant change in "Exempt properties"; 4531 reported in AR07 and 4519 in AR08.

- As in the previous year, the data used to report non-household properties in the A tables and P tables comes from the same source. Data checks confirmed that these tables are consistent.

- Unmetered non-household customers are charged for the cost of installing a meter if they opt to switch to a metered supply ahead of the full business metering switch over in 2010. The switch from a unmeasured to a measured supply has effectively stopped during the AR08 period because from 2010 all non-household customers will be fitted with a mandatory meter under the full business metering programme currently underway. Essentially customers are waiting for a free meter.

**Methodology - Unmeasured Domestic Properties**

Scottish Water has used a consistent methodology for reporting and forecasting property and population numbers for AR08 and SR10. The methodology is essentially the same as in previous years except that there has been a change in the national policy for dealing with second homes and long term empty properties. These categories are now included in the unmeasured household billed properties count. The approach uses data listed in A1.1 above.

Scottish Water has based the number of unmeasured domestic properties receiving water and wastewater services on the 2007 WIC4 mid year return. Scottish Water considers that this year's WIC4 return provided the most reliable data to date.

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 includes Council Tax reductions where applicable. 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 2007 has been greater than was forecast in SR06 by 73,034 (2,368,648 compared with the forecast of 2,319,643). Since AR07, the increase has been 30,012 including exempt properties, which declined by 3,778. Part of the increase is due to the billing properties which in the past were connected but not billed. 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 Year +1 number of properties has been estimated by updating the 2007 WIC4 figures for total households using growth in the Ctaxbase between 2004-05 and 2006-07.

The total by band and discount category is reported in the P tables.

**Methodology – Measured property data**

Measured property data have been abstracted direct from Business Stream's HiAffinity database and compiled for the A and P tables. There is consistency between the relevant lines in the two tables. Neither Scottish Water nor we are in a position to audit the figures provided by Business Stream. We understand that no direct access to the data will be available in the future.

When auditing SR10, Section 8, it was identified that about 21,000 field troughs may not have been included in the number of non-household unmetered "properties". It was also reported that following a survey of 1,200 field troughs (of 7,900 troughs on the billing

system billed as a fixed charge), the number of unrecorded connections may be up to 3.5 times as many as the number on the billing system. The number of connections and lengths of service pipes will have an impact on the water balance, leakage calculation and ELL and if the sample survey is correct also on the number of connected properties". The extent of this possible error needs investigating.

We assume that for future returns the billed property data and volumes delivered data will be supplied Central Market Agency.

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**

The method of recording household and business new connections has not changed during 2007/08. All new connections are contained on a Scottish Water WAMS/Ellipse system from which reports can be produced by month, year or for a defined period. Scottish Water is planning to introduce a new system for recording applications and connections during 2008/098. A small number of new water connections do not have a corresponding foul water drainage connection due to self-treatment. There were 22,702 new water connection in 2007/08 and 21,583 sewer connections of which about 7.9% were non-household connections in each category. 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.

Scottish Water reports that it provides Business Stream with new connection data for the period prior to the market opening.

**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

Trade Effluent charging and recording is complicated by the three different systems used by the predecessor companies, the capping of charges increases for individual customers and a harmonisation cap associated with the new Central Marketing Agency. During the audit it became evident that SW's standard query of the database was not picking up the correct consent values and the final numbers used for the return have not therefore been examined. The fault does not affect individuals' actual charges, and in view of the future use of the CMA in charging it is doubtful that SW can make worthwhile improvements to the system at this stage.

Figures are reported for all treatment works including PPP works.

**Comments by line**

Line 1: The number of unmeasured household billed plus exempt and excluding void properties has reduced by 12 from the previous return.

Lines 1, 6 12 & 17: Growth in connected properties of 1.1% reflects an annual increase (of about 0.5% (determined by GROS) and long term decline in occupancy ration, estimated to change from 2.17 to 2.16.

Lines 2, 7: The numbers of measured household water properties are taken from the Business Stream HiAffinity billing system. For future years the numbers will be supplied by Central Market Agency.

Lines 4, 9: There has been a further reduction in the numbers of measured non-household water properties since AR07 from 79,271 to 76,513. The numbers are supplied by Business Stream from their HiAffinity billing system.

Line 8: Unmeasured non-household connected properties has declined by 1,624 to 55,156 including exempt and void unmeasured properties. Exempt properties are 12 less than in the AR07 return. Void properties are reduced by 1,268 to 6,397. The overall impact on the number is a reduction of 2.9%.

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. As commented in 2007, we accept that the records are likely to be good, and certainly within the confidence grade assumed by Scottish Water.

Lines 13, 18, 24, 31: The numbers of measured household drainage properties are taken from the Business Stream HiAffinity billing system. Numbers of metered household properties connected and billed for drainage are smaller because not all properties receive all services. All declined during 2007/08.

Lines 15, 20, 26, 33: The numbers of measured non-household drainage properties are taken from the Business Stream HiAffinity billing system. With the exception of Line 26 which increased by 14 to 405, all lines reduced since last year by between 1.4 and 4.4%. The reason for the reduction is unknown and for measured non-household billed properties, the reduction is less than that for water services.

Lines 23 to 35: We have not audited these lines on the basis of materiality.

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. SW reports that a part of the reduction arises from its policy of removing low risk discharge points form the TE charging programme

Line 37: Connected properties have increased by 201 to 3553 since 2007. This increase in part reflects how the consent process reports connections. 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 as 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: Trade effluent loadings are declining in line with the number of billed properties. 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. The COD:BOD ratio is 2.3, a figure derived from SW WwTW records only. .

**Comment on Confidence Grade**

Scottish Water has almost universally assigned A2 confidence grades to the 2007/08 report year data. For the majority of lines this is reasonable, recognising the sources of the numbers and how they are derived.

Many small trade effluent discharges are not charged because to do so would be uneconomic. Confidence grades for numbers of properties (lines A1.36 and A1.37) seem reasonable at A2. However although there has been considerable work to improve the quality of the data related to trade effluent load, the estimated loads are based on detailed records but do still require some degree of extrapolation from sample data and estimated volumes at year end. Further there are minor discrepancies between AR08 and SR10, P tables and Table 17. We consider

an A3 confidence grade, would be more appropriate reflecting information changes to consent and discharge information but with lower confidence in quantities and hence loadings

The confidence grades for Report Year +1 Forecast are reasonable; A3 or N, but with A2 grade for Measured household lines, reflecting the sources of data from which the numbers were derived and the accuracy of the forecasting component. It is also appropriate to assign N to the lines related to Business Stream customers.

## 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:

- Winter population data is calculated from the GROS 2006 base Scotland total projections and a revised methodology for assessing household size (occupancy ratio), numbers of population in households and numbers not in households. The ratio of total to occupied households and populations derived from the GROS 2004 complete dataset is then applied to the 2006 data. Connection rates are derived from the WIC4 2007 return to calculate populations by connected to water and wastewater services.

- Occupancy ratios have fallen from 2.17 to 2.16.

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

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

- For the 2007/08 OPA report the estimated PCC is 146.98 l/h/d excluding supply pipe leakage and plumbing losses, the latter being included in published figures for other companies. The PCC including plumbing losses is 153.45/153.59 l/h/d, (without and with void properties included respectively). These figures can be compared to the WASC average for England and Wales of 151.5 l/h/d in 2006/07.

- There is a discrepancy in Table A2 resulting from how the line item calculates the unmeasured household PCC including plumbing losses (154.24 l/h/d). The net effect is to slightly overestimate the value. This results from the line item uses an average Underground Supply Pipe Leakage (UGSP) for both occupied and void properties rather than the assessed individual values of 47.05 l/prop/d for occupied properties and 50.35 l/prop/d for void properties.

- We note that sewer cleaning, WWTW operations, Scottish Water depots and Scottish Water jetting have all been included in Water Taken Legally Unbilled. English and Welsh companies may include some of these categories 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.

- Water Taken Legally Unbilled now includes 7,800 animal trough connections billed as a fixed charge. However sample surveys in rural DMAs concluded that there were in the order of 3.5 unrecorded animal troughs per billed troughs. The estimated usage is therefore based on an assumed 29,000 troughs.

- The number of trough connections is not included in the reported number of non-household connections. Although leakage from the underground supply pipes has been estimated using the assumptions used for measured and unmeasured connections, when considering the unrecorded locations of the majority of the connections in this category and the potential lack of maintenance, the resultant UGSP leakage of 1.19 Ml/d may be underestimated

- We are pleased to see that progress is now well underway to improve the leakage control function at SW. We note that there is now a new Head of Leakage Delivery with 2 regional leakage managers reporting to a General Manager, The DMA programme is virtually complete 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 significant challenge to Scottish Water.

- Leakage has reduced by 80 Ml/d to 924 Ml/d. which is 69 Ml/d above the agreed leakage target for 2007/08 of 855 Ml/d.

- The leakage reduction is comparable with the combined reduction in DI and increased reported usage. If it is assumed that changes in pcc and non-domestic water consumed are actual changes but that water taken legally unbilled did not change materially in the year then the actual leakage reduction is of the order of 45 - 50 Ml/d.

- The overall balancing error, to reconcile distribution input with the water balance components was 26.26 Ml/d (1.2%), although this was not used for the reporting year.

- We question the assumption that 95% of water consumed is returned to sewers. We note that SW has applied the figure set down in WICS reporting requirements.

**Comments on Methodology**

The methodology for projecting population and adjusting forecasts for different data sources and reporting dates are similar to methods used in previous annual returns. The population estimates and outputs to tables result from manipulation of data obtained from third parties. Specific changes to the methodology adopted for AR08 are detailed below. However it should be noted that during the audit Scottish Water provided additional summary sheets for the population Methodology and the Water Balance calculations and provided detailed narrative of the elements making up the water balance; *2007 Populations Method.xls* and *Water Balance 2007/08 Calc2008.xls*. The documentation explains the methodologies and calculations. This additional information significantly contributed to being able to understand the detailed calculation necessary to derive individual line numbers. Subject to any comments below we believe that Scottish Water has adopted a comprehensive methodology and that the reported numbers in table A2 give a reasonable indication of Scottish Water's water balance.

Many AR08 numbers which are also the starting numbers for the SR10 forecasts are derived from WIC4 returns and Business Stream Hi-Affinity billing database. We understand that direct access to the Business Stream Hi-Affinity data will not be available in the future.

Line A2.1: Winter Population Estimates

The Winter population data is calculated from the GROS complete dataset ( http://www.gro-scotland.gov.uk/statistics/publications-and-data/household-projections-statistics/household-projections-for-scotland-2004-based/list-of-tables.html ), GROS 2006 base Scotland total projections ( http://www.gro-scotland.gov.uk/statistics/publications-and-data/household-estimates-statistics/household-estimates-for-scotland-2006/list-of-tables.html), the GROS 2004 base Scotland total projections (http://www.gro-scotland.gov.uk/statistics/publications-and-data/popproj/04pop-proj-scottishareas/list-of-tables.html), the GAD 2006 population forecasts ( http://www.gad.gov.uk/Demography_Data/Population/ ) and a revised methodology for assessing household size (occupancy ratio), numbers of population in households and numbers not in households. Calculations are based on Mid Year Estimates

Scottish Water continues to report the winter population for water and wastewater as 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. The population not in households with water is 87,124, an increase of 1,268 since 2006/07. For this return it has been calculated from: *(2004-based Projected Population updated to GAD less Calculated 2006 Private Household Population) multiplied by proportion of households with water.*

The total winter water population is 4,978,553, an increase of 23,821 since the previous return (0.48%).

*Population Projections for "Report Year + 1 Forecast"*

Projected Total Populations and Households are derived from the GROS 2004 data using growth rates 2007 to 2017 factored by GROS 2006 MYE to make an adjustment between the forecast number of households and the 2006 reported number. *(GROS 2004 All Households by year times Projected Population updated to GROS 2006 MYE divided by 2004-based Population Projections).*

*Population in unmeasured households with water*

The occupied household population number is calculated from *(2004-based GROS Projected Total Population updated to GAD times Private Household population to total population Ratio times Water Households to total Dwellings Ratio).* The GAD data is used to update 2004 data to reporting years.

The derivation of the "Report Year +1 Forecast" number is described above.

As stated in Section 1.2 above for the table A1 commentary, the number of SW connected occupied households is known.

The same is method is followed for wastewater.

*Population not in households with water*

The population not in households with water is calculated from *([2004-based GROS Projected Total Population updated to GAD minus Private Household Population] times Water Households to total Dwellings Ratio).*

The derivation of the "Report Year +1 Forecast" number is described above.

The same is method is followed for wastewater

Vacant households with water is calculated from WIC4 report *([2007 Total Dwellings – 2007 Occupied Dwellings] times Water Households to total Dwellings Ratio).*

The derivation of the "Report Year +1 Forecast" number is described above.

The same is method is followed for wastewater

*Occupancy Ratio*

Occupancy ratios have fallen from 2.17 to 2.16. Domestic and household growth is derived from WIC4 data as the baseline property data and GROS data to forecast growth. There is a general consensus that future growth patterns will highlight a trend towards lower occupancy dwelling units and changes in the banding profile towards the higher banding. Scottish Water has therefore developed a growth model to reflect these two trends. The projection of future populations is calculated using the population projections from GAD and Scottish Government projections.

The calculation allocates the GROS estimated increase in households for future years to the WIC4 (AR08 reported) base household data by RV Band. The GROS data is apportioned to the Council Tax Bands using a split derived from a comparison of Bands from WIC4 data for AR06 and AR08. The Band apportioned GROS household growth numbers are then added to the AR08 WIC4 data to project household by bands into the future. Some data cleansing was necessary to make the two sets of WIC4 data compatible. The methodology and a sample calculation were audited. We consider that the approach is thorough and provides a consistent approach for future returns where no alternative external data are available.

Line A2.2: Summer Population estimates

The summer population is the winter population plus the tourist population. For 2007/08, summer population was estimated to be 5,240,500 (5,212,070 in 2006/07), an increase of about 4,600.

The methodology to assess the additional summer population has not changed beyond this return is based on a new data set on accommodation for visitors abstracted from Yell.com. The methodology is:

- VisitScotland information on average bed space per type of holiday accommodation.
- 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.

Populations were calculated from the number of bedspaces per property type and the monthly occupancy figures from Visit Scotland. The total number of bedspaces per property type is calculated, and allocated to the water and sewered operational areas. For all of Scotland the number of occupied bedspace nights is calculated from monthly occupancy times the number of bedspaces. The monthly totals are summed over the 12 month period, to calculate the average and 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. The difference in summer and winter populations is the highest tourist population in any one month in the year.

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

The additional summer population is 261,950 and increase of 4602 on the previous year estimate. No growth in additional summer population is forecast for the "Report Year =1 Forecast".

**Water balance**

Introduction

Scottish Water currently prepares its water balance on the basis of the Integrated Flow Method; that is the measure of all inputs making up water use subtracted from distribution input (DI). The balancing item is leakage, which itself is not measured.

The preferred method would be to 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. This method can only be used if leakage is measured throughout at least approximately 90% of a supply area, but ideally the whole of a water utility's area. Leakage is usually measured using District Meter Areas (DMA).

At the year end Scottish Water now has a > 92% coverage of DMAs, installed as part of its on-going developments in leakage control (up from 70% last year). Of these, approximately 80% are currently giving estimates of leakage, up from 76% last year. Scottish Water has adopted the Integrated Flow Method because of its relatively low penetration of DMAs as averaged during the year, even though it had a small discrepancy between the top down and bottom up water balance. However, next year an MLE adjustment will be possible.

Line A2.26: 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 l/h/d and in 1999 139 l/h/d . We are not aware that the reduction in PCC between 1991 and 1999 was

ever fully explained. The 1999 study was a snapshot taken in September. 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.

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 l/h/d , 3 l/h/d 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 2006/07 Scottish Water estimated its PCC as 147.7 l/h/d, 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 were 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.

Last year we audited the calculations back to the base data received from the 3 companies and accept that the calculations had been properly done. While the seasonal variations were similar there were significant differences between the growth variations. Scottish Water took an average of the 3 results. Other datasets were likely to give different results.

The revised figure for 2006/07 of 147.7 l/h/d excluded plumbing losses which are included in the published figures of other companies. Including Scottish Water's estimated plumbing losses increases the 147.7 l/h/d to 153.7 l/h/d . This figure can be compared to the WASC unmetered domestic average for England and Wales of 151.5 l/h/d in 2006/7.

For this year SW repeated the calculation obtaining a slightly reduced figure of 146.98 l/h/d excluding supply pipe leakage and plumbing losses. The slight reduction results from a re-evaluation of 2006 monthly profiles to remove the exceptional July 2006 recorded PCCs from the growth factors used in the 2006/07 review of the 1999 Household Consumption Report. The net effect represents 4 Ml/d (0.5%) reduction in the estimated unmetered consumption.

The PCC including plumbing losses is 153.45/153.59 l/h/d, (without and with void properties included respectively). Table A2 calculates a PCC of 154.24 l/h/d including plumbing losses. The difference between the two calculations relates to how the PCC is calculated in Table A2 line 25 by disaggregating Line A2.12 backwards using an average Underground Supply Pipe Leakage (UGSP) for both occupied and void properties rather than the correctly assessed individual quantities. UGSP value for occupied properties is 47.05 l/prop/d and for void properties is 50.35 l/prop/d whereas Line 25 uses the average figure of 48.09 l/prop/d for all types of void properties.

For AR09 it should be possible to derive the unmetered PCC from the Household Consumption Survey of about 5,500 properties which is currently being implemented and starting to deliver data.

Line A2.12: Total unmeasured domestic consumption

Total unmeasured domestic consumption includes void properties. The volume is calculated by multiplying the PCC by the estimated population and adding allowances for internal plumbing losses and underground supply pipe leakage. For void properties only losses and leakage are included in the volume.

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. Alternatively such properties could be allocated to water taken legally unbilled, Line A2.27.

The reported total unmeasured household volume of water delivered is 863.35 Ml/d reduced by 29 Ml/d from AR07. The reduction is reported to result from using a revised figure for

Underground Supply Pipe Leakage (61.08 l/prop/day to 47.05 l/prop/day), equal to about a 32 Ml/d reduction. However the PCC reduction described above also represents about 3.5 Ml/d reduction. Population growth should therefore account for the difference equal to 6.5 Ml/d. component. However the additional winter population is 23,821 or about 3.5 Ml/d. Part of the difference will be attributable to a difference in the population numbers used in table A2 and the water balance (4,890,288 and 4,894,377 respectively equivalent to about 0.7 Ml/d), but there is still a difference of an additional 2.3 Ml/d delivered but not accounted for in the calculation for unmeasured households.

The population difference results from the data used by the Water Balance Team being supplied in February 2008 before final changes and additional data had been incorporated into the population forecasting model. Minor population forecasting issues related to when data was passed between different teams were also identified during the SR10 audit. We would suggest that there be closer linkage between teams using common input and output data for different purposes to ensure that these minor discrepancies are eliminated.

*Plumbing losses*

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 6.3 l/h/d (slightly up from 6.0 last year but similar to the previous year, 6.4) to the current PCC estimate of 147.0 l/h/d .

The overall average internal plumbing losses are estimated at 13.65 l/prop/day based on an analysis of 2117 DMAs using Scottish Water's analysis tool "Perform Spatial Plus" (PSP). The tool 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. The difference between this figure and the Managing Leakage default is difficult to explain but the higher figure has not been used.

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 base PCC calculations.

<u>Line A2.13: Measured household consumption</u>

Scottish Water has approximately 530 water measured household connected properties. This is 65 less than in 2006/07. Consumption is recorded by meter and, subject to meter under-registration, should be accurate. Measured consumption at approximately 177 l/h/d is significantly reduced from the 245 l/h/d reported in 2006/07, but is still 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.

Line A2.15: Measured non-household consumption (potable)

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

Measured non-household consumption is calculated from meter readings taken from Business Stream billings system (Hi-Affinity) at end March 2008. 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 assumed that there will be no increase in measured non-household volume of water delivered for the current volume.

Measured non-household water consumption increased by 24 Ml/d to 464 Ml/d. The quantity comprises 443 Ml/d derived from the actual meter readings obtained from Scottish Water meter readings to which 21 Ml/d meter error (4.8%) was added. The metered quantity is 47 Ml/d greater than the quantity billed by Business Stream for the same period (394 Ml/d). Scottish Water does not know nor have access to the reason for the difference between the two quantities. It is reasonable that future reports from Business Stream include commentary in the reasons why billed quantities do not correspond to the meter readings supplied by Scottish Water.

The metering project for unmeasured non-households has not made a material difference to the number of meters installed during the period primarily due to the policy to install meters free of charge from 2010 and therefore there is no financial incentive for potential meter optants to apply beforehand. More reliable quantities will only become available once the new policy is active. The current figure 64.68 Ml/d should to be viewed with uncertainty as stated in previous reports.

Line A2.20: Measured non-household (non-potable)

The reported volume of non-potable is 12,943 Ml/d. This volume has changed from previous returns and is forecast for the coming year. The majority of the quantity is reported to be based on contractual agreements and only a small quantity is metered and reported through Hi-Affinity. This is different to previous years where it was reported that the majority of the consumption was metered and only about 33% of the total was estimated.

We have commented on the uncertainty of this item in previous years and the need for clarification in future returns. In the light of the majority of the volume not being monitored, we suggest that the only way that SW can better understand these volumes is to meter these supplies even if the method of billing remains unaltered.

Meter under-registration

Scottish Water does not undertake routine calibration of its domestic meters. As for previous years it has applied an average meter under-registration figure reported by Ofwat for England and Wales water and sewerage companies of 4.0%. While this is a generally accepted figure our experience is that this may be high. As Scottish Water only has 530 domestic meters the figure is immaterial. Irrespective of the number installed, it is still good practice to establish and maintain a programme of meter calibration and maintenance.

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 which is 4.8%, the same as for AR07. This figure is consistent with our knowledge where calibration has been done and so we believe that the resulting estimate is acceptable.

A2.14 Unmeasured non-households

Scottish Water has used the methodology first adopted for the AR07 Return. The analysis compares the metered and non-metered consumption using rateable value as a descriptor and the WICS sector codes (e.g. hotels, banks) by rateable value bands. Using linear regression techniques RV band, consumption and rateable curves were generated for each metered non-households sector. These curves were then used to calculate the consumptions of each unmeasured non-household based on its rateable value.

For this return there are 48,759 occupied properties with a net estimated consumption of 62.33 Ml/d, plumbing losses of 0.67 Ml/d which are included in the estimated consumption and Underground Supply Pipe losses of 1.98 Ml/d. The losses and leakage from the 6,397 void properties represent an additional 0.37 Ml/d. The total reported Unmeasured Non-household Water Delivered is 64.68 Ml/d which is 0.37 Ml/d higher than in 2006/07. The increase results from changes in the number of supply points (356 No.), investigation of void property supply points (additional 2.38 Ml/d) and reductions resulting from supply points being metered.

Scottish Water is reported to have installed over 30,000 meters of the 40,000 planned. Initial readings have started, but converting this category of consumer to Metered Non-domestic will not start until 2009/10 with 100% coverage planned for 2011/12. More reliable figures are therefore not available yet and are not likely to be available for the next Return. Scottish Water could benefit from maintaining the initial reading programme and analysing the readings to better understand this category of demand.

The methodology is reasonable, but we suggest that the new figures continue to be uncertain. The ideal will be when all Unmeasured Non-households become metered supplies in 2011/12.

A2.32 to A2.36 Underground supply pipe leakage

The methodology for calculation of underground supply pipe leakage is as for previous years.

Underground supply pipe leakage is added to consumption to calculate water delivered. 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 Scottish Water has completed investigations of 100 supply pipe leaks to establish flow rates. The analysis of the sample flow rates suggested a flow rate of 0.79 $m^3$/hr/burst. Burst rates are currently about 2.1 per 1000 properties which is slightly down from 2.5 per 1000 properties in 2006/07.

For the Water Balance, Underground Supply Pipe Losses are 116.7 Ml/d which is 31.8 Ml/d lower than the previous year. Scottish Water has estimated its underground supply pipe losses on unmeasured domestic customers at 47.05 l/prop/d (compared with 61.08 l/prop/day for 2006/07). This reduced quantity is still significantly higher than comparable average in England and Wales for 2006/07 at 36.1 l/prop/d (range 7.8 to 61.7.

Scottish Water has used published data for England and Wales to calculate supply pipe leakage for different property types and whether the meter is external or internal. 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.

We recommend that Scottish Water continues to develop its sampling to confirm current assumptions as well as seeing if it can develop its methods.

Overall we conclude that:

1. All estimates of supply pipe leakage are uncertain.

2. Scottish Water's figures are higher than those typically used in England and Wales. 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 allow us to judge whether supply pipe leakage is indeed likely to be above those in England and Wales.

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

Lines A2.18 and A2.31 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). Penetration of DMAs for Active Leakage Control has increased to 94% of properties supplied (75% of mains length) from last year's figure of 70%. DMA operability is reported to be currently at 80%. Programmes for implementing pressure management within DMAs and auditing PRVs (maintenance and optimizing performance) will continue through 2008/09. These programmes are critical to delivering real leakage savings.

There is a difference in the reported numbers in the commentary and Table A2 after the balancing error adjustment of 807.348 Ml/d and 808.538 Ml/d respectively. The difference is less than 0.15%. The commentary relates to the figures in the Water Balance Spreadsheet, the detail of the source data for which is discussed above.

Leakage has reduced by 80 Ml/d to 924 Ml/d. which is 69 Ml/d above the agreed leakage target for 2007/08 of 855 Ml/d. The leakage reduction is comparable with the combined reduction in DI and increased reported usage.

The following table summarizes the net changes in the major components of the water balance. The material changes in the reported lines are summarized as:

| Ref | Description | Unit | 2006-07 | 2007-08 | Diff'n |
|---|---|---|---|---|---|
| A2.11 | DI | Mld | 2296 | 2271 | -25 |
| | PCC | lcd | 147.7 | 146.98 | -4 (Ml/d) |
| A2.15 | Meter non-domestic water consumed | Ml/d | 440 | 464 | +24 |
| A2.27 | Water taken legally unbilled | Ml/d | 34 | 63 | +29 |
| A2.18 + A2.30 | Leakage | Ml/d | 1004 | 924 | -80 |

If all other items had remained the same the DI reduction of -25 Ml/d would represent actual leakage reduction. If it is assumed that changes in pcc and non-domestic water consumed are actual changes but that water taken legally unbilled did not change materially in the year (changes being due to methodology changes) then actual leakage reduction in the year is of the order of 45 - 50 Ml/d rather than the 80Ml/d implied by the reported changes. The additional water taken legally unbilled may well have always been there, in which case leakage estimates in prior years would have been lower. All estimated figures remain uncertain.

The overall balancing error, to reconcile distribution input with the water balance components was 26.26 Ml/d (1.2%). This compares favourably with the 169.90 Ml/d (7.4%) error in 2006/07.

Scottish Water estimates service reservoir leakage at 11.79 Mld (11.62 Ml/d in 2007/08), based on "Managing Leakage" default value of 0.333% per day of storage capacity. There were no known overflows during the period. It is best practice for utilities to routinely undertake service reservoir leakage tests as part of periodic inspections. Conversely measuring service reservoir leakage can be difficult where control is in poor condition /not maintained or the valve configuration prevents reservoir or cell isolation. 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.

Scottish Water now has the infrastructure and organisation in place to make inroads into its leakage. Scottish Water has agreed a revised leakage target for 2008/9. We believe that this will be a challenging target for Scottish Water.

Line A2 -17: Water taken legally unbilled

This year Scottish Water has estimated this figure as 44.51 Ml/d an increase of 9.94 Ml/d over last year's figure of 34.57 Ml/d.

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.

While generally water taken legally unbilled has been increasing in England and Wales as companies have been investigating their actual figures Scottish Water is apparently 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:

| **Item** | **Estimated Consumption** | |
|---|---|---|
| | **2006/7 (Ml/d)** | **2007/8 (Ml/d)** |
| Standpipe licences | 16.1 | 12.41 |
| Fire Service | 13.1 | 14.97 |
| WWTW Operations | 3.98 | 15.73 |
| SW Depots and offices | 0.4 | 0.32 |
| SW Jetting | 0.99 | 1.08 |
| **Total (2006/07 comparison)** | **34.57** | **44.51** |
| Animal troughs | 0 | 16.35 |
| Temporary building connections | 0 | 2.31 |
| **2007/08 Return** | **34.49** | **63.18** |

Significant increases have come from WWTW operations and animal troughs.

*Standpipe licences demand*

Standpipe demand has reduced by 3.6 Ml/d. Since last year Scottish Water has implemented a change in strategy. Standpipe users are now licensed. 3,300 licences were issued during the year, equivalent to a 1,356 full year equivalent. The total number of issued licences in 2006/07 was 1048. Usage is estimated by category of user based on the metered consumption from 300 standpipes that represent the demands from the majority of the range of standpipe uses.

Overall estimates of usage assume that standpipe consumption is the same average as those used to derive the estimates by category, even though the usage may be very different. Even where the usage has been estimated the figures are uncertain with significant assumptions being made of flow rate and duration. 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 extend to metered usage surveys where appropriate to improve the accuracy of the estimate. Until it is done this section of the water balance will remain very uncertain.

*Fire Service demand*

The methodology for Fire Service demand has been revised for this return. Current usage has been assessed based on the National Fire Statistics (Scottish Government) which are reported two years in arrears, interviews with the Fire Service and by measuring hose flow rates. This return is based on 14,770 primary fires and 33,898 secondary fires (11.66 Ml/d) and the operational demand for training (1.3 Ml/d), appliance testing (0.05 Ml/d) and vehicle washing (1.94 Ml/d). This represents an increase of 1.85 Ml/d to 14.97 Ml/d. For the previous year Scottish Water reported that fire demand amounted to 9.2 Ml/d and all non-emergency usage was 3.91 Ml/d. Fire flows have increased and other uses has reduced in 2007/08.

The majority of Fire Service demand is for emergency fire fighting. Different fire brigades have different policies on water use, some using water and others foam. We accept that Scottish Water has used improved data available, but until water used per incident can be better estimated (correlation between distribution system metering and specific incident flow rates and duration) the figure will be subject to significant error.

*WWTW operational demand*

The majority of the increase in water taken legally unbilled results from a change in methodology for assessing WWTW operational usage (increased from 3.98 Ml/d to 15.73 Ml/d) whereby in previous years only the metered demand from PFI scheme works was reported whereas for this return, Scottish Water metered the demand at 160 works (representing 33% of the PE) to establish usage by WWTW type and PE banding. Given the additional metering undertaken by Scottish Water we believe that the revised figure is reasonable.

*Scottish Water Depots and offices demand*

There is a marginal reduction in this item. The quantity is the measured volume for all Scottish Water offices and includes contractor staff and Business Stream offices.

*Scottish Water jetting demand*

There is a marginal increase in this item due to the increase in number of events. The quantity is estimated from the number of events in the year identified from the WAMS system for works orders for jetting and the previously assumed flow rate (10 l/s) and duration (15 mins).

In addition to the 5 category headings used for last year Scottish Water now include the demand from animal troughs and temporary building connections.

*Animal troughs*

The billing system includes 7,800 trough connections billed as a fixed charge. An analysis of 1,200 metered troughs concluded that the average trough usage is 558 l/trough/day. Sample surveys in rural DMAs concluded that there were in the order of 3.5 unrecorded animal troughs per billed troughs. The estimated usage is therefore based on an assumed 29,000 troughs. The methodology is considered reasonable, but because of the estimated number of unrecorded troughs, further field studies will validate the conclusions from the relatively small sample from which the 3.5 factor was derived.

The number of trough connections is not included in the reported number of non-household connections. Although leakage from the underground supply pipes has been estimated using the assumptions used for measured and unmeasured connections, when considering the unrecorded locations of the majority of the connections in this category and the potential lack of maintenance, the resultant UGSP leakage of 1.19 Ml/d may be underestimated.

*Temporary building connections*

This is a new category amounting to 2.31 Mld in the year. The usage is estimated from the number of new building licence connections supplied by the new connections team and an estimated average water demand per new build derived from Scottish Government Construction Statistics, 2007.

*Conclusion*

Our overall conclusion is that while Scottish Water has tried to make a proper estimate of water taken legally unbilled and has made significant progress towards improving the methodology and estimates within each category, there is still uncertainty resulting from the many assumptions and when projecting detail more widely. 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 the work on sample surveys should be extended and where appropriate meters be installed to measure actual demand (for example all WwTWs) temporary building connections, supply metered standpipes for billing quantity used, animal troughs to monitor usage). Using actual metered usage will enable Scottish Water to significantly improve the confidence in its estimate.

Line A2-28: 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** | |
|---|---|---|
| | **2006/07 (Ml/d)** | **2007/08 (Ml/d)** |
| Occupied voids | 0.88 | 0.80 |
| Illegal standpipes | 3.85 | 1.76 |
| Fire hydrant misuse | 0.67 | 0.51 |
| Total | 5.40 | 3.07 |

Consumption for all the categories has reduced since 2006/07 from 5.40 Ml/d to 3.07 Ml/d, the significant reduction being 2.09 Ml/d for Illegal standpipe use.

Scottish Water has assumed that 5% of void properties will be occupied. Domestic voids in Scotland are reported as 2.5% of total domestic properties, a similar figure to England and Wales where voids are closely monitored. We believe that Scottish Water has made a

reasonable assumption. There is a 9% reduction from last year in a very small consumption quantity.

Illegal standpipe numbers are 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.

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

Line A2.29 - Distribution system operational use (DSOU)

This year Scottish Water has assessed this volume at 4.89 Ml/d an increase of 1.12 Ml/d over last year's figure of 3.77 Ml/d. A comparison of the two figures is shown in the table below:

| Item | 2006/07 (Ml/d) | 2007/08 (Ml/d) |
|---|---|---|
| Reservoir cleaning | 0.22 | 0.62 |
| Planned flushing and swabbing | 0.002 | 1.77 |
| Burst repairs | 0.6 | 0.50 |
| Water quality (customers) | 0.97 | 0.89 |
| Water quality sampling | 0.12 | 0.12 |
| Mains rehabilitation and new mains | 1.86 | 0.99 |
| Total | 3.77 | 4.89 |

The total quantity is made up of 6 categories as last year. Expressed as a percentage of distribution input (0.2%) the quantity is generally lower than companies in England and Wales. This is to be expected given Scottish Water's high levels of leakage. However due to the high level leakage levels and uncertainty in the estimate because of the method used to calculate leakage, we suggest that the overall volume for DSOU is likely to be comparable to other companies.

Scottish Water has changed the assumptions used for estimating reservoir cleaning, mains rehabilitation and programmed flushing exercises based on site surveys, interviews with operations personnel, shadowing exercises, data collection and using historic event records. For individual categories, methodology and data improvements effect a marginal change in the estimated quantity, two increasing and three reducing.

The largest single category usage is for Planned Flushing and Swabbing where there has been a significant increase in the number of recorded regular events from 20 in 2006/07 to 251 in 2007/08. For this return, the estimated usage was derived from the results of a shadowing exercise to measure the usage of over 25% of the events and then apply an average duration and flow rate base on the observations to the other events.

In previous years we have commented on the approach to estimating mains rehabilitation and new mains usage. For this return, Scottish Water has revised the assumptions following shadowing exercises to review flushing volumes. This has resulted in a reduction in usage.

It should be recognised that for this return Scottish Water has undertaken shadowing exercises and revised assumptions of flow rates and duration. It would be hoped that future Scottish Water will implement a process for systematically recording event, duration and flow rate in order to increase the number of events with actual data to increase the reliability and thereby confidence in the reported usage – for example routinely using a standpipe flow meter for flushing exercises through fire hydrants. 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.

Summing water taken legally, illegally and distribution system operational use and comparing it to water delivered indicates that the former is approximately 5.1% of the latter. The average for all WASCS in England and Wales is approximately 2.9%

Lines A2.10 and A2.11: Distribution input

Scottish Water only supplies water to customers within the Scotland. There are no exports to or imports from third parties. There are some interregional transfers with the Scottish Water supply area, but the net effect is zero within the water balance.

Distribution input (DI) has been calculated from measured flows on telemetry, recorded on data loggers that are routinely downloaded and from returns completed by production staff who read the bulk meters at water treatment works. Twenty seven works account for approximately 80% of the DI. The data are stored in a data warehouse. During 2007/08, Scottish Water has started to complete monthly data validation reviews including reporting monthly DI. This is a change from previous years where the DI was compiled primarily form weekly and monthly works production staff reports. The current system continues to include production staff data, which is used to check electronically derived data or to complete records where there has been an instrument failure. DI data is accessible on the Scottish Water website (The Zone). The change in approach is summarized in the following table.

| | **Telemetry data - auto reporting** | **Logged meter manual download** | **Estimated and historic trends** |
|---|---|---|---|
| April 2007 | 48% | 0% | 53% |
| March 2008 | 31% | 48% | 20% |

During 2007/08, there has been considerable progress in improving the quality of data from flow meters. Of 299 operational sites, 76 works representing 95% of the DI are metered and

data are being processed and at 129 sites meters are fitted with data loggers, but not all are operational. However Scottish Water also reported that there were commissioning issues at some works and with meter availability that were being worked through. Site surveys including physical inspections of installed meters and assessing where telemetry or data loggers should be installed or the current reporting process continue.

Scottish Water has developed a Best Practice Strategy for data collection and processing that is currently awaiting internal approval.

The meter replacement programme is driven by the conclusion of the site surveys and meter accuracy verification programme. The meter verification programme, covering all DI meters, includes independent flow monitoring to calibrate the meter and output signals for telemetry. Meter error assessments are also being undertaken using point to point direct comparison, secondary measurements and sub system balancing techniques. Indications are that meter error is within 5% to 10%.

Overall there has been considerable progress in improving the measurement of DI. However Scottish Water needs to maintain effort to complete meter coverage and reliability, the verification programme and to consolidate a long term meter maintenance and verification process.

Line A2.39 to A2.45 Sewage volumes

Scottish Water has applied a rate of 95% as set out in the definition set down by the WIC.

The audit identified that where measured water volumes were used to calculate the total sewage volumes, they excluded supply pipe leakage.

Line A2.46 to 60 Sewage Loads

The total load reported in line A2.55 includes loads discharged to PPP works (identified separately in line A2.60).

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 is distributed to individual works by address point count within drainage area boundaries, which have been expanded for the year's developments. Population is 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 is 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. Consequently SW pro rata up the tourist numbers in each drainage area until the total number of tourists is equal to the number for the region as a whole.

While the quality of the allocation to individual works may be uncertain, the overall assessment remains reasonable.

- 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. 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; and

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

  We note that Scottish Water has carried out some limited sampling to determine the rate of return of water to sewerage from non-domestic properties, and that the figure (97.6%) has been used. The strength of this sewage is assumed to be the same as domestic (300 mg/litre). 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 366 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.

Line A2.61 to 62 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 year's sludge report is based on figures from the fiscal year 2007-08, whereas previous reports have been based on calendar years.

Note that 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 the report year the company has relied almost exclusively on measured sludge data. The measurements maintained by Scottish Water are detailed records of individual loads, and the whole data set is derived from Gemini by SW and from TDS which is operated by the contract sludge transport company. 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, varying from three times daily to occasional. Where sludge loads have to be calculated averages are used; it should be possible to verify lime additions from lime delivery 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.

Scottish Water controls and records all sludge movements it has responsibility for through its own Gemini system and through its sludge transport contractor's TDS system. The TDS also records sludge use in agriculture for loading applications and repeat periods.

We believe that the records maintained and checks undertaken by Scottish Water are adequate to report 100% satisfactory sludge disposal.

**Comments by Line**

*Populations*

Lines 1: The winter population is reported as 4,978,553, which is an increase of approximately 0.48% from the previous return. The population is higher than was projected for this report year in the previous return by 17,053.

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 summer population is 5,240,496 which represents an increase of 28,423 (0.54%) since the previous return. It is also higher than that projected in the previous return for this year by 21,655. The Report Year +1 Forecast is predicting a lower growth for next year, 17,735 (0.34%).

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 4,890,288 which is an increase of 0.47% from the previous return.

Line 4: The population of measured households is calculated from the number of measured domestic properties from Hi-Affinity multiplied by the occupancy rate. The figure reported this year is 1143 which is an reduction of 12% 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 4,708,678 which is an increase of 875 (0.02%) from the previous return. The decline may reflect the reductions in measured volumes (reference line 42): the figure includes the population for measured waste.

Line 9: The assumed percentage returned to sewer is 95%, which Scottish Water has stated as the industry standard and is supported by the WIC definitions.

*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, although findings from the verification project indicate errors in the range 5% to 10%. Meter replacement, calibration and reporting projects are currently under way to improve reporting of Distribution Input. DI is reported at 2,271.17 Ml/d reduced from 2006/07 by 24.77 Ml/d (1.08%). The projected DI for next year assumes that WIC leakage target of 840 Ml/d will be met.

Lines 12 & 25: Unmeasured domestic water delivered has reduced by 29.02 Ml/d since 2006/07 to 863.345 Ml/d. Underground Supply Pipe Leakage is estimated to have reduced equal to about 32 Ml/d reduction and an adjustment to the PCC contributes a further 3.5 Ml/d reduction. Population growth should therefore account for the difference equal to about 6.5 Ml/d. component.

Lines 13 & 26: Scottish Water only has a domestic metered population of 1143, reduced by 155 (12%) since AR07. 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.

The volume delivered has reduced due to the reduction in metered properties and the reduction in metered consumption to 177.37 l/h/d including plumbing losses but excluding supply pipe losses, a reduction of 66.48l/h/d (27%).

Lines 14 & 23: There is no material difference in the consumption of unmeasured non-domestic properties since the previous year (0.4% increase) and no change is forecast for 2008/09.

The policy to meter all non-domestic customers by 2012 has effectively stopped the applications from non-domestic consumers for metered connections and therefore a reduction in the numbers against this line item. Numbers will change from 2010. Further commentary is included in the methodology section for non-household supplies.

Line15 & 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 24.48 Ml/d (5.6%) since last year.

Lines 17 & 27-31: Water taken unbilled has reduced by 6.9% since last year for the reasons given in our narrative on methodology. Scottish Water forecasts that there will be a further reduction of about 7.4% primarily resulting from reducing leakage to 840 Ml/d, the 2008/09 target.

Line 18 & 30: There is a difference in the reported numbers in the commentary and Table A2 after the balancing error adjustment of 807.348 Ml/d and 808.538 Ml/d respectively. The difference is less than 0.15%. The commentary relates to the figures in the Water Balance Spreadsheet, the detail of the source data for which is discussed in the methodology commentary above.

Leakage has reduced by 80 Ml/d to 924 Ml/d. which is 69 Ml/d above the agreed leakage target for 2007/08 of 855 Ml/d. The commentary above provides a breakdown of more significant changes in the water balance concluding that the actual leakage reduction in the year is of the order of 45 - 50 Ml/d rather than the 80Ml/d implied by the reported numbers.

Line 20: There is no change in this line item since last year and Scottish Water forecast that the quantity will be unchanged in 2008/09. This raises a question concerning the confidence grade for this line item.

Lines 31 - 36: The methodology for calculation of underground supply pipe leakage is as for previous years. However during 2007/08, Scottish Water used the field measurements to revise estimate underground supply pipe losses on unmeasured domestic customers down to 47.05 l/prop/d from 61.08 l/prop/day for 2006/07. This revised quantity is still significantly higher than comparable values for in England and Wales.

Lines 37 & 38: The estimated figures are based on industry averages.

*Sewage volumes*

Line 39 It is unclear whether unmeasured household volume includes or excludes the Supply Pipe leakage allowance. There is no verification of the assumption that 95% of the per capita consumption is returned to sewers.

SW reports that volumes have increased by 4.1% in line with population and per capita consumption increases.

Line 42: This figure has reduced by 6.1% in line with the water measured non households.

Line 43: The reduction is in line with the decrease in the properties connected.

Line 45: This has significantly increased. Scottish Water attributes it to better systems and processes. We note in Table B4 that planned emptyings are up.

*Sewage Loads*

Lines 46 to 59: The reported data refers to all loads discharged to sewer including that treated in PPP plant.

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.

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.

Line 50: The trade effluent load is derived from individual billing records which are linked to treatment works.

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).

Line 52 to 54: Taken from SW's Gemini records applying 6.543 to the volumes removed from private and public septic tanks respectively..

Line 55: This is the sum of lines 51 to 54. 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.

Line 58 & 59: Calculated from the total load divided by 60g. 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. All figures are from the Gemini system. SW reports that the increase of advanced treatment comes from commissioning new facilities at a number of its larger works.

**Comments by Confidence Grade**

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

Lines 1, 3-6 & 8: The reliability grades have been raised from C to B to reflect the use of the latest sources of data, being only one year behind the base year for return. We accept the grades proposed

Lines 2 and 7: The grades for the lines are unchanged from the previous return.

Line 9: The grades for the lines are unchanged from the previous return. Confidence grade A2 for an assumed industry norm which has not been validated for Scotland could be high. However, we accept that the 95% figure is a requirement of WICS reporting requirements.

Lines 10 and 11: Scottish Water reports an improved confidence grade of C3 based on the improving availability and quality of data and the implementation of a corporate database. Meter accuracy and reliability are issues to be addressed (see also commentary above). We accept the change of grades from the previous year.

Lines 12, 25: Based on old data and extrapolated using a sample of 3 WASCS in England and Wales. We accept the grades for the lines which are unchanged from the previous return. See also our comments in the commentary concerning the calculation error in Line 25.

Lines 13, 15, 24: Scottish Water is the source of the data. There has been no change in methodology. The grades for the lines are unchanged from the previous return.

Line 14: Scottish Water has assigned grade B4 to the AR08 return. The data has been calculated using consumptions derived from recent equivalent

metered consumer categories. We believe that the proposed grade is appropriate for AR08 and Report Year +1 Forecast.

Line 16: This is a calculation line. The grades for the lines are unchanged from the previous return. We suggest that the grade of the single largest item line 12 may be more appropriate, C4.

Line 17, 27-29: Line 17 is the sum of lines 27-29. The grade for Line 17 reflects the grade for largest of the summed lines. Measured data has been used for this return to revise and validate assumptions used. We accept the improved grades proposed

Line 18, 31-36: WIC guidance indicates that a reliability grade B is appropriate where total leakage is estimated using either the Integrated Flow Method or the Minimum Night Flow Method. The basis of this return is the former, but the partial DMA coverage enables Scottish Water to implement Active Leakage Control which encompasses principles of the latter. In addition the closing error for this year is 1.2%. Scottish Water has assigned improved grades of B3 from D4 last year. Given the closing error (even though not formally used with an MLE adjustment) we accept the improved grades proposed for AR08. The similar confidence grade assigned for Line 18 for the report year +1 can only reflect an intention by Scottish Water.

Line 19: The accuracy component has improved to C3 from C4 in the previous year. For the reasons detailed in line 18 and in the commentary above we accept the grade proposed.

Lines 20: The grade for the line is unchanged from the previous return.

Line 23: This is a calculation line. The grades for the line are unchanged from the previous return.

Line 26: This line is linked to Line 15 with confidence grade A2. Confidence grade B2 reflects the work undertaken to understand the different non-household consumption types. We accept the grade proposed.

Line 30: This is a calculation line. The grades reflect the sources of data. The grade has improved to C3 from C4 reflecting the calculation data sources. We accept the grade proposed

Lines 31 to 36: The Confidence grade for these lines has improved from C4 to C3 reflecting the reflecting the conclusion from analysing flows from an increased number of events. We accept the grade proposed

Lines 37 and 38: The grades for the lines are unchanged from the previous return

Lines 39 to 60: Further to the comment for line 9, all calculations using the 95% assumed value are subject to the error grading appropriate to the accuracy assigned to line 9.

Lines 39 and 41: We accept the grade proposed.

Lines 40, 42 & 43: The grade for the line is unchanged from the previous return.

Line 44: This is a calculation line. We accept the grade proposed.

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

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

Section B gives information on customer services including low pressure, interruptions, customer contacts and other service information. Our responses in each table give full information, including key points.

## 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

***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 7772 to 5907. The main movements are additions due to better information (2445) and removals due to better information (2738). 1096 were removed due to operational changes and 540 due to asset improvement. 64 properties were added to the at risk category due to operational changes or asset deterioration.

- Scottish Water has continued to transfer information onto a Tactical Application attached to its customer contact system ,PROMISE, and to reduce reliance on previous spreadsheets. 671 cases remain on the spreadsheets, all of which are without a known property addresses. The transfer process should be complete in August 2008 when the Tactical Application will be subsumed within a Strategic Application for the Low Pressure Register. By that time the properties on the original register should have had their low pressure status confirmed or have been removed because of better information or because of company action. The Strategic Application will contain all low pressure records (complaints) from PROMISE as well as properties on the low pressure register.

- SW has used the term "data cleansing" to describe the process of confirming low pressure properties. However, the process is based on direct pressure monitoring on networks, zone by zone, we believe that the Tactical Application is therefore a realistic statement of SW's position for its low pressure properties, recognising that there will continue to be a low incidence of new discoveries.

- 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.

- Scottish Water records 1225 properties within 10.5m head of 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

Data cleansing was described in the 2006-07 audit and has continued using the same methods in 2007-08. Briefly the method comprises the following:

Pressure logging is carried out over a two week period in each WSZ. Corporate GIS data is 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 is noted and a calculation is carried out using the digital terrain model to calculate the pressure at each property which had been assigned to that logger. Any properties which have a pressure less than 15m were considered to have a problem. The reports from this work are used to add and remove properties from the spreadsheet register. The property tap pressures are not checked as part of the study. Any properties that are deemed to have a problem are then entered onto the new corporate register with their full address details.

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. However, the Tactical Application does pick up the number of properties served by the same pipe and the Strategic Application should include this function when it comes on stream in August 2008. 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.

The "Tactical Application Water" records all low pressure complaints from PROMISE and those that are quickly dealt with by operational action or further investigation are flagged to exclude them from the register. Many complaints of low pressure result from blocked service pipes.

During the audit we asked to review examples of supporting information which led to changes to the register. We saw 4 reports with appropriate detail from low pressure investigations and actions

Data cleansing exercises include pressure logging investigations. Reports with distribution pipe plans and logger positions and results are prepared and remedial work undertaken by the appropriate SW partner. Following the work half a week's further logging is required before the properties are removed from the register SW requires a second logging exercise during a high demand period to confirm that the properties should remain off the register. Given that the properties are removed before the second logging exercise we believe that there may be a risk of removals remaining without the check being done, possibly several months after the initial work. We recommend that SW considers putting a provisional flag on all properties that have not had the additional check and that these properties are reported in future annual returns.

We believe that the continuing 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 far 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.

Only 671 of around 13000 cases originally identified as being at risk of low pressure remain on the spreadsheet. These are all cases where a property address is not recorded. SW intends to clarify each of these by desktop study or by a logging exercise so that the Strategic Application is the only system in use. SW will use PROMISE to identify and record new low pressure cases. Scottish Water has made a significant advance in establishing a reliable low pressure register, and we look to the achievement of a higher confidence grade next year

**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 investment and operational changes.

Line 9: This is a calculated field showing the balance of 5907 properties at the year end.

Line 10: These are properties receiving low pressure but omitted from the numbers reported in Line B2.9 as required by the WIC definitions.

**Comments on Confidence Grades**

We believe that the confidence grade of B3 is reasonable.

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

**Introduction**

*Key points:*

- The new IMS process whereby operatives enter data on handheld devices is now operational across the whole of Scotland. This includes "force validation" 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 for some of last year.

- Manual data entry from site operatives still happens where IMS coverage is not possible. Scottish Water's Tweed region and SW's contractors still used manual data entry in the reporting year but should go to direct entry by June 2008

- For the first half of the report year the data from IMS was downloaded and stored in a single interruptions spreadsheet for all operational areas. In October 2007 this was replaced by a "Corporate Data Repository" (CDR) and the spreadsheet data migrated onto it..

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

**Comments on Methodology**

*General*

The new Integrated Mobile Solution (IMS) process, which uses handheld devices to directly enter data, is now operational for the second year across the whole of Scotland for Scottish Water's Staff. Data still come into the database from SW contractors 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 has been a further significant improvement in data completion since half way through the report year 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 from the OMC 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. The process states that the interruption sheet cannot be opened until this form has been completed.

*Handheld devices*

At the audit last year 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, the interruptions sheet can be opened to record the water off time. Later the sheet can be re-opened to complete on time. There is a box for a second "water on" time which 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.

There are always likely to be 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.

We note that information on unplanned interruptions can 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 11 to 25 come from an analysis of the interruptions recorded on the "Corporate Data Repository" {CDR} which contains information on both planned and unplanned interruptions We note the following on the CDR information:

- Actual date and time off: this records the time that supply was confirmed to be lost as assessed 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 often 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 reporting*

The IMS data is sent from the handhelds to ELLIPSE and to the IMS server. The is downloaded from the IMS server into the Corporate Data Repository (CDR) for data storage and reporting. Standard queries are used to extract management information monthly and for the year end reports and returns.

The CDR has been in use since October 2007 except for some manual reporting summations due to be automated by June 2008. All the data acquired between April 2007 and the opening of the CDR was migrated to give full data for the year.

Scottish Water has 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.

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 does not round entered times but we note above how operatives may tend to 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.

*Review of Sample data*

At the audit the data was examined. The data is complete as submitted and the reporting figures confirmed.

We believe that the IMS and CDR systems have led to improvements in data records. It will always be possible for an operative to omit to enter site date, although this should not be a major problem as following a customer complaint the job is logged onto Ellipse and operatives are chased up.

Property numbers 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 a relatively low figure that could be estimated fairly easily

**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 have increased since last year, most probably as a result of greater capital work on the system.. This is likely to increase again as additional relining work is undertaken. |
| Lines 15-18: | The number of unplanned interruptions and the properties affected is significantly reduced from last year. This is particularly true for the > 6 hours. SW reports that it has targeted mains that historically have had high levels of interruptions and has improved its processes. Interruptions on trunk mains have been lower, explaining the reduction in the > 12 hrs figure. |
| Lines 19-22: | The number of interruptions caused by third parties is much reduced since last year. SW reports that this is largely due to the previous year's very large incident affecting 5000 properties. |
| Lines 23 to 25: | This is the number of overruns of planned interruptions and is significantly up from last year. This is due to an incident at Kilwinning affecting 3,585 properties.. |

**Comments by Confidence Grades**

Scottish Water ascribes a confidence grade of A3 to all data on interruptions, up from B3 last year. This appears reasonable given that all information now comes through corporate systems.

## 5.4 Table B3: Sewage Flooding

### Commentary by REPORTER

*Key points:*

- The PROMISE customer contact system, with the associated choke sheets and site checking by SW Performance Analysts is the key source of data on sewer flooding incidents.
- Flooding incidents are reported on main sewers only
- The sewer flooding register is a Technical Application deriving from PROMISE data. It is a register of properties at risk of flooding due to over-loaded sewers and includes information on flooded properties migrated from historic data 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. Investigations have led to the removal for better information of 468 properties and 107 by company investment.
- Last year there were significant numbers of missing data and SW applied an "uplift" to account for them. This year missing data was much reduced. The uplift was still applied. Scottish Water's confidence grade of B3 is considered to be 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 .

***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 a datamart that allows for flexible business reporting from the corporate data. The monthly reports are manually entered into a spreadsheet for data analysis purposes and for reporting to senior SW management.

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 and the customers' perception of the problem is recorded at the customer contact stage.

All flooding incidents are investigated by a field team. As for water main interruptions information, data is either recorded on a paper form or on a field device such as a laptop computer. Field staff are expected to complete electronic "choke" forms on their laptop computers that show whether a flooding caused internal or external flooding, whether it was caused by overloading or other causes, and whether the seat of the problem lay in a main sewer or a lateral sewer. During the year 2005/6 it was found that a very significant number of records were missing. Therefore throughout the report year 2005/6, Scottish Water performed a "data uplift", by which it augmented the recorded number of flooding incidents and affected properties to reflect non-compliance with some of the processes for gathering data from the field.

This problem remained for the first 6 months of this report year. In October 2007 SW set up a new management system which included additional activities by a number of staff including Network Performance Analysts (NPA). The NPAs' duties were extended to checking all records of sewer flooding and ensuring that all fields were correctly entered. .

As soon as the new system was in place, SW held workshops to impress on its workforce the importance of correctly filling the right data. It also required the NPAs to go back over missing information and to try and populate the data as far as could be done. This was done by talking to the individual teams and in some instances talking to customers. For the remainder of the year the new management system was policed by a task force under the direction of senior managers who received monthly performance data on compliance. The NPAs continued to endeavour to populate any data missing from forms returned by field staff.

This led to a much improved data accuracy, although 100% compliance has still not been possible. Forced validation for sewer flooding, which would assist compliance, has yet to be imposed on the devices but SW hope to implement this in the future.

Despite the data cleansing following the first 6 months of the year, SW recognised that data deficiencies were such that the uplift exercise should continue and this was done for the whole year. SW further reports that it is now sufficiently confident that its data is accurate enough to allow the uplift exercise to be discontinued.

Extreme rainfall is identified from customer perceptions initially by the call centre and later by site staff. No checks are made to Met Office data on the grounds that it is insufficiently detailed and expensive when it is. Insofar that SW is beginning to have to deal with the least tractable and most expensive flooding cases for investment, it is possible that SW should reconsider

.

**Comments by Line**

Lines 2 to 5: The number of flooding incidents due to overloaded sewers is reported as 44 on main sewers only, slightly down from last year. The numbers are more accurate this year due to improved processes, which may be a factor in differences from last year.

Lines 6 to 12: Annual flooding other causes has been reported on main sewers as 184. The number of properties affected is 238 which is less than last year. The figures exclude laterals.

Where the root cause of the flooding is not known SW allocate the numbers between main sewers and laterals in proportion to those that are known.

Lines 5 and 11: Scottish Water has reported these figures this year following improvements to its processes.

Line 4: 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.

**Comments by Confidence Grade**

Lines 2-12: In the light of the improvements noted above SW believes that a confidence grade of B3 is now acceptable.

During our main audit we reviewed the information and initially remained of the opinion that a confidence grade of B4 should remain and this was reported in the OPA report. As a result of the difference of opinion SW asked the Reporter to review his work again. This was done and as a result this amended version of the OPA report has been issued. The key points of the review are as follows:

- We reviewed whether it was reasonable of SW to assume that its workforce would remember details of incidents dating back in some instances 6 months. Based on the number of items posted on its customer contact system, its operational areas and number of gangs in each area each gang would attend about 5 flooding instances per month. This is not a large number and given that some gangs keep diaries and that some customers were approached we have concluded that it was probable that most of the cleansed information was accurate.

- Following the cleansing SW advised us that 76 items of data remained missing in its records of flooding incidents during the report year. These relate to missing data concerning whether the flooding was internal or external or from mains or laterals. However, some relate to the same property and so the missing data that impacts the reported number of incidents is likely to be less. Making an adjustment indicates that around 10 of the records could be wrong and were omitted. The uplift added 16 incidents to the return (13 to other causes and 3 to overloaded sewers).

From this review we conclude that:

- SW has made real efforts to improve its reporting of sewer flooding; and

- by incorporating the uplift it is reasonable to assign a confidence grade of B3 this year.

***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 2005/06 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.

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.

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 including the remainder of those not subject to customer survey at March 2007.

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).

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. 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. Over 6000 surveys were undertaken and this information has now been used to amend the information on the register. This has been the main reason for the rapidly falling list of properties on the register.

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 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. "Holding" is a 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 a consideration 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.

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.

We note from our audit work on the Business Plan that Scottish Water is approaching a "steady state" situation where properties will be included in the flooding register at (or near) the same rate as sewerage investment removes them. At this time the costs of flooding relief may be higher. We therefore recommend that Scottish Water reviews its methods for recording flooding, internal and external, so that the register is accurately maintained. 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 generally had reasonable supporting data. However, there were some inconsistencies

in the register from older, inherited data which are likely to await the detailed investigation from the early part of the investment process.

Our conclusions are as follows:

- The current at-risk register has been greatly improved. Generally numbers are based on reported flooding incidents, some of which are supported by drainage area studies or customer survey. However, the base records include some that 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 also recommend that Scottish Water develops a procedure for checking total numbers of properties (including surrounding properties) for newly flooded properties, including consideration of the 1 in 20 year category.

**Comments by Line**

The internal flooding register has reduced in the report year by 479 properties, 107 were removed due to authority action, 468 were removed due to better information, and 96 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.

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.

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. 14 are reported this year. Scottish Water stated that it does not believe that the Meteorological Office can provide sufficient information for localised storm events to determine if they are exceptional. It does 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. 157 are reported this year. This generally entails the use of isolating valves with pumping.

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.

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 increased 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. The figure is lower than the previous year, reversing a previous trend of increasing cost. This was due largely to a number of schemes, each of which removed several properties at a reasonable unit cost.

Line 25: Scottish Water has not identified any opex costs relating to the permanent solutions installed in the year.

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 is very similar to 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 100. This figure has not been audited.

**Comments by Confidence Grade**

Lines 13 to 23: Given that the results of the survey data have been incorporated in the register we accept Scottish Water's suggested confidence grade of B3.

## 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.
- The Register only contains flooding events thought to have been caused by hydraulic overload. 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.
- While Scottish Water's methodology for external flooding is the same as for internal flooding the validation carried out for internal flooding is not carried for external flooding. Confidence in the answers is therefore lower.
- 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. SW reports that it will continue to report on the assumption that laterals are not included until it is informed otherwise.

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

**Comments on Methodology**

While Scottish Water's methodology for external flooding is the same as for internal flooding the validation carried out for internal flooding is not carried for external flooding. Confidence in the answers is therefore lower.

**Comments by Line**

Lines 2 to 5: The total number of flooding incidents due to overloaded sewers is reported as 461 which we believe are on main sewers only.

It should be noted that this year companies in England and Wales are required to report even very small instances of flooding, significantly increasing reported numbers.

Line 6: Scottish Water states 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 1 & 7: Scottish Water states that it does not record numbers of areas flooded.

Lines 8 to 10: Annual flooding, other causes, has been reported on main sewers only as 6365, lower than last year.

**Comments by Confidence Grade**

Lines 2-12: Given the lack of complete information this year we consider that a confidence grade of B4 suggested by Scottish Water is reasonable.

***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.

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..

Lines 22-25: Scottish Water has identified a figure of £3190. No schemes were undertaken last year.

**Comments by Confidence Grade**

Lines 11 to 25: Given the current difficulty of assessing the true numbers of properties at risk and checks have not been carried as for the internal flooding we consider that a confidence grade of B4 suggested by Scottish Water is reasonable

## 5.6 Table B4: Customer Service

### Commentary by REPORTER

### Introduction

For the entire year Scottish Water has been split into two parts: Scottish Water and Business Stream. Business Stream (BS) 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, Business Stream took on the responsibility of operating the "Hi-Affinity" billings system which generates the bulk of the figures for lines B4.1 to B4.14 and part of lines B4.15 to B4.21, which relate to written complaints. Scottish Water retains a small billing section to bill for such items as trade waste. 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 Business Stream under a SLA. The Reporter is not required to audit BS.

While SW and BS still use a common telephone system this has been split by lines and there is no need for SW to allocate data between the two organisations.

*Key points:*

Subject to auditing SW's new billing system 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.

SW now has a much improved system of dealing with GSS payments.

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.

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

Scottish Water tries to log all contacts onto Promise (Customer contact System). A significant number of incoming calls were transferred. Calls are not transferred to BS, rather customers are told the BS number to ring. Transfer calls relate to calls to other departments within SW. 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.

Septic tank emptying is recorded on a dedicated commercial database called Gemini, which is well known for recording tanker movements. .

**Scope of the audit**

We held 4 meetings with personnel in Customer Services:

- Customer contacts
- Customer billings
- Telephone contacts
- GSS payments

**Comments on Methodology**

*General*

There have been two main changes to Customer Services in the reporting year:

1. SW has set up its own small billings department to bill for metered domestic customers, trade effluent and septic tank emptying.

2. SW has set up a dedicated GSS team.

In previous years we have described Scottish Water's systems and methodology in this section. For completeness we repeat this with minor amendments below.

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. "Peoplesoft", a billings database, which is a module of SW's Peoplesoft financial accounting system.

Together with the main module of 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 Resolution: the call centre

2. Customer Relations and Household Billing
    a. Household billing via local councils
    b. Field Customer relations comprising 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.
    d. Business support (including other billing)
    e. Quality and performance
    f. Processes

3. Other departments
    a. Trade effluent
    b. Customer marketing
    c. Work planning
    d. Telemetry

The Customer Resolution is manned 24 hours per day for 7 days a week. Customer billings 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. Promise is used to schedule work resulting from customer contacts, including such items as investigating sewer flooding.

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 managed on Promise and so is available should the customer ring again).

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 (now BS) and Promise. Given the reduction in data requirements from last year this fact is less obvious. 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.

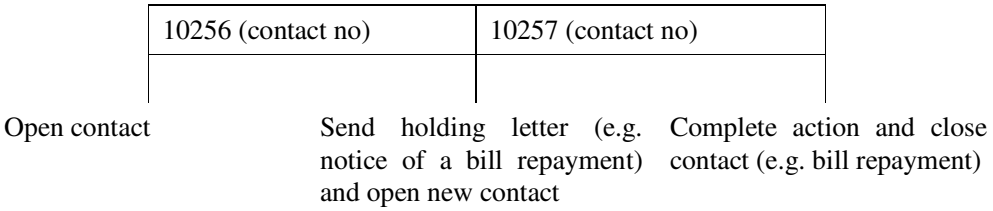
*Peoplesoft billings system*

SW retains a small billings department which bills for:

- Septic tanks
- Trade effluent
- Standpipes
- Laboratory
- Metered domestic customers

The department has opted to use the billing module of its "Peoplesoft" financial accounting system for its work. In the first 6 months of operation the department issued approximately 12,000 invoices.

Peoplesoft is structured the same way as Promise in the way that it logs contacts. This is illustrated below:




The two contacts are recorded as separate contacts on Peoplesoft.

In previous years we had concerns that Hi Affinity was used as a work scheduling system, with the possibility of codes being muddled. We confirm that Peoplesoft is not used for this purpose.

First time resolution contacts are not logged onto Peoplesoft, which therefore does not keep a record of all contacts in the department.

As for Promise, and subject to our comments on voids above, we believe that Peoplesoft 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 Peoplesoft. 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. We understand that Business Stream will be re-locating its offices in the foreseeable future.

*Complaints*

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. Last year 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.

*Telephone calls*

Telephone calls are logged on the "Contact Centre 6" (previously Symposium) telephone system. In addition BT records all calls by site and date.

Scottish Water currently has 105 domestic incoming customer service lines which imposes no restrictions on the system.

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) but does not do so on Peoplesoft. In 2005/6 we noted that a significant number of incoming calls were transferred. Calls are not transferred to BS, rather customers are told the BS number to ring. Transfer calls relate to calls to other departments within SW. 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.

Scottish Water uses BT's Message Link system during emergencies, of which there are several every month. During our audit we noted that these amount to a very significant percentage of all calls. These are correctly included in the return based on information provided by BT. This is an improvement on last year where the information was logged on a spreadsheet and the result added to the Symposium figures for the reporting period.

SW assumes that all calls logged onto Message Link are successful. WICS guidance states that calls that are not answered within 40 seconds should be considered to be abandoned (assuming that it takes 20 seconds to answer). We reviewed a small sample of the statistics from the BT download and noted that Message Link responded almost instantaneously (on average in 2.3 seconds). We also noted that there were one or two calls that had not been answered in 20 seconds. We therefore concluded that there were a few calls which should have been recorded as "calls abandoned" but that they were probably not material. We believe that a search on the system could identify the calls and SW is considering its response to recording such calls.

*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. 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.

The team prepares the statistics for lines B4.30 to B4.40 monthly.

We believe that the reported figures are therefore likely to be reasonably accurate.

**Comments by Line**

Lines 1-7: For the first 6 months these were recorded on Hi Affinity until the Peoplesoft system was up and running.

Initial telephone contacts that are dealt with at the time are not included in the figures.

As for previous years enquiries about new connections are not recorded in these lines as they are diverted to developer services. We believe that this is correct as they do not relate to metered accounts.

Debt recovery calls are excluded.

The figures are significantly lower than last year as they only relate to wholesale business billing.

Lines 8-14: Scottish Water has made a zero return for these lines as for the report year Peoplesoft has not had the ability to offer customers alternative methods of payment. We understand that this ability was going to be implemented in mid-May. For the report year, change of payment method enquiries were logged as general billing enquiries and returned in lines 1-7.

Lines 15-21: Written complaints have decreased by approximately 37% over last year. This is explained by the separation of the business stream return.

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

- Information directly generated by the telephone system.

- Information from BT's Message Link system.

We believe that both figures are now accurate. Last year Message Link data was recorded in a spreadsheet which lowered confidence in its accuracy.

The numbers include for calls diverted elsewhere in the business.

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 25%, largely due to the SW-BS separation.

Calls abandoned expressed as a % of total calls received is little changed from last year.

Lines 30-40: The return indicates that there has been a slight increase in septic tank requests but a larger increase in actual septic tank emptyings carried out. This is largely explained due to the fact that pre-planned emptyings have increased.

We note that SW plans to modify Gemini reporting to improve internal monitoring and simplify reporting including the use of mobile field devices, IMS.

**Comments by Confidence Grade**

Scottish Water has assigned A1 grades to "Billing/Charging/Metering enquiries. We see no reason why the contact information should not be accurate, as reflected in the A1 grade.

For new written complaints Scottish Water has moved its confidence grade to a B2 from last year's A2 (itself a change form the previous year's B4). SW reports that the change is because it cannot report reliably on the few written complaints received outside customer services coupled with the fact that customer relations records its statistics on spreadsheet it has reverted to the B2 grade. We accept this change. We note that improved systems will be in place for this coming year. Total numbers of written complaint correspondence has been given a confidence grade of B2 up from last year's B4. Given that last year the Business Stream did not link follow up correspondence we believe that the change in confidence grade is reasonable.

We accept the confidence grade of A1 for the information on telephone contacts. The recording of Message Link data has improved over last year.

We believe that the confidence grade assigned by Scottish Water to septic tank emptying is generally reasonable.

## 5.7 Table B7: Customer Care – GMS Performance

### Commentary by REPORTER

### Introduction

*Key points:*

- In previous years we reported some weakness in allocating GMS data to the relevant table lines. We are pleased to report that SW has set up a dedicated GSS team and data are reported from the team's monitoring spreadsheets (one for each type of payment) leading to much higher levels of certainty in the allocations.

- 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.

- Previously there was no central checking that GSS cheques had been dispatched, cheques being sent to the individual who requested the cheque. Now all cheques are dispatched by the team who are also informed whether the cheque has been cashed.

### Comments on Methodology

For the reporting year GSS payments have been managed by a small dedicated team. The team generally obtains its information from access to Peoplesoft, Promise and other corporate systems. GSS payments relating to Customer Relations comes from information provided by Customer Relations. Most ex-gratia payments are public liability claims and are managed by Scottish Water's Claim Team who inform the GSS team of the requirements.

The GSS team manages its work using control spreadsheets, one for each claim type. Data from these spreadsheets are used to enter the information for Table B7. The GSS team manage the process, including dispatch of cheques. On the issuing of a GMS or Ex-Gratia payment the GSS Team or Claims Team include a copy letter to allow the customer to confirm receipt of the payment. It is the customer's choice to send back the receipt but in the majority of cases this copy letter is returned with signature and date to confirm receipt of payment. SW's bank account is also monitored to check if the cheque has been cashed. We note that Scottish Water doesn't telephone a customer to confirm receipt but the customer has 6 months to cash the cheque from date of issue. If the cheque hasn't been cashed it will automatically be put on hold with the Bank. If a customer tries to cash the cheque later than 6 months it will not be allowed by the Bank but this will not stop Scottish Water being able to issue a replacement cheque.

We believe that the new system is a significant improvement on previous years. Given the relatively few numbers of payments we believe that the use of spreadsheets is acceptable. However, if increasingly payments become automatic, such as happens for sewer flooding , we believe that SW should consider the use of corporate systems to control payments.

Information on payments is currently captured in the Promise System but this is via a free text area in the workbench.

**Comments by Line**

Planned interruptions have increased by 14% since last year. The number of claims for planned interruptions is down from last year, attributed by SW to better process. Unplanned interruptions have increased by 7.5% since last year. The number of GMS failures claimed for unplanned interruptions are up by 14.8% on last year. SW attributes this to two major incidents.

Sewer flooding incidents are reduced from last year (90% of last year's total). However, the number of payments is up by 80% with the amount paid increasing by 106%. SW attributes the increase to improved verification by its staff.

Payments for failures to deal with billings contacts and customer complaints are significantly reduced this year. We believe that this results mainly from the wholesale/retail split but is also a factor of SW's emphasis on its OPA score. 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 reduced by 14% this year. Failures have been very significantly reduced, a fact that SW attributes to improved processes.

The most significant GMS payments were ex gratia payments and are significantly reduced this year. SW attributes the majority of the remaining payments to vehicle incidents.

**Comments by Confidence Grade**

SW has made a number of changes is confidence grades this year as explained in its commentary. These changes are accepted.

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

### Commentary by REPORTER

***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 AR08 covers the 2007 calendar year and is consistent with the Annual Water Quality Report 2007 prepared by Scottish Water.

### Comments on Methodology

*Mains bursts per 1000 km*

The methodology used for reporting mains bursts is as for AR07. The data for the report year comes from WAMS, the burst repair work orders entered into WAMS coming from two sources. This arises mainly from customer reports of leakage and partly from active leakage control . In both cases the work is carried out by both our SW's staff and external contractors managed by Scottish Water.

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 has yet to implement 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.

During our audit we were able to see the entire spreadsheet of burst data. We noted that there was no specifically required entry to confirm that the original Work Order, which may have come from a customer contact had been confirmed as a burst. The "Standard Work Order Description" does carry a comment but confirmation is often only implied e.g. "Repair 3in main" or "repair leak on 4" main". We believe that the absence of a site identified direct confirmation of a burst the data does reduce confidence in the data.

Burst or fault location is related to property address code for the complaining customer or the nearest property. This may not identify the correct pipe in the street. Site staff do have the ability to enter a revised grid reference but this is not mandatory and is frequently omitted.

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.

For reporting purposes relevant work order codes are selected from WAMS. The data is then manually inspected by the IDR group at Castle House without reference to operations and cleansed to remove duplications and coding errors.

We believe that the methodology could be improved by using mandatory resolution codes for field work in order to improve the accuracy of the data, and automating the current manual to spreadsheet process.

*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 2007 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 UKASE, 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 and data supplied by the Water Balance Team. SW's methodology for the preparation of lines B8.2 – 8.9 was developed for 2007 Annual Return, is well documented and closely follows the detailed methodology defined by WIC.

The methodology excludes a significant number of WTWs because of 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. Similarly, the data

set includes only samples taken for regulatory purposes and excludes samples taken for operational reasons.

**Comments by Line**

Line B8.1: The reported number of bursts per 1000km of main shows a small increase compared to last year, apparently reversing a reducing trend. However, we do not believe that a single years figure is necessarily material. Scottish Water reports that increasing leakage control may cause the figure to rise in future years. This will reduce the use of mains bursts as an indicator of asset condition.

Lines B8.2 – 8.9 Results indicate that 19 works out of 54 analysed had a 96%ile greater than 0.5NTU. This is a higher figure than last year. It is also a high percentage compared to some companies in England and Wales although the PCV may not be exceeded. Scottish Water reports that many of its smaller WTW are excluded from the analyses due to the small number of regulatory samples taken.

**Comments by Confidence Grade**

Line B8.1: The number of bursts comes from the WAMS/Ellipse database. Until the reported numbers show less variation giving confidence that the new reporting is robust the confidence grade of B3 seems reasonable.

Lines B8.2 – 8.9 The water quality information is of high quality and the assessed confidence grade of A2 is considered reasonable.

***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. Data is related to the property address of the problem, not the position of the asset involved. This is particularly prone to error where there is more than one sewer in the road.
- Scottish Water's PROMISE and WAMS/Ellipse work record system do not require operators to complete resolution codes enabling easy accurate analysis of the data for sewer collapses and blockages and pumping main bursts.

- Historic data has been consistently available for blockages since Scottish Water was formed, but the quality of data is variable. Blockages which cause flooding have been excluded from the figures..

- 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.

- We agree with Scottish Water statement 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.

- .Equipment failures are greatly reduced from last year, where they included failures at sewage treatment works and failures of civil engineering assets such as manhole covers. This year failures are limited to MEICA equipment at pumping stations, CSOs and storm tanks. The data includes all reactive work orders, even when it has not resulted in a physical repair. Difficulty is being experienced by regulators in defining a suitable descriptor and such is the diversity of approach to this indicator it should not be used for comparison purposes. Provided the definition stays constant it may have some use in detecting trends.

- 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*

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.

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. None of the works orders relate directly and specifically to a collapse although since the initial contact is likely to be from a lay person (customer complaint) this isn't necessarily available information.

The squads who carry out the work are the best people to identify whether the work is on a public sewer or not and whether it is the sewer that has collapsed or not. However, this information is not necessarily captured. In our review we have seen the full data from which the number of collapses is derived and are concerned that other information may show that a sewer collapse was not the problem. The table below shows some examples chosen at random on one day.

| WO No | Standard Job No | Standard Job No Description | Work Order Description |
|---|---|---|---|
| 01293075 | SRPR01 | REPAIR SEWER CONN PIPE | EX TO REMOVE ROOT MASS REPAIR 100 DIA |
| 01293207 | SRPR01 | REPAIR SEWER CONN PIPE | REPAIR AT FLANGE WORK AFTER VALVE DIMMIN |
| 01293381 | SRPR01 | REPAIR SEWER CONN PIPE | S15.1 REPAIR SEWER CONN PIPE |
| 01293590 | SRPR02 | REPAIR MAIN SEWER < 150MM | S16.1 REMOVE DRAIN RODS FROM SEWER |

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 and again SW is dependant on non-mandatory amendments to the WAMS record; there is no resolution code for this.. 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.

We recommend that recording of collapses and blockages is improved. It should not be possible to close a works order until the resolution of the job is clear and accurately recorded and the position of the problem has been amended in line with the SW asset

*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. Within the report year Scottish Water has continued to find that the some "resolution codes" used to categorise contacts were missing. The same uplift system has been used as for sewer flooding reports (see the report for Section B3).

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.

Scottish Water exclude blockages that cause flooding on the grounds that there would be double counting.

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.

In 2007, Scottish Water noted that its new Information, Data and Reporting group was charged with making material improvements to the robustness and confidence in collapse and blockage data. However, issues with not recording blockages associated with flooding, poor resolution clarification in the PROMISE and WAMS data, and the need for continued adjustments for the uplift system indicate that further improvements are still necessary.

*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.

The data harmonisation study between Ellipse and Corporate GIS to identify those IDs which do not exist, or which have been abandoned was completed in 2007/08. All the data is now contained in the Ellipse corporate system and changes should be limited to new discoveries from completing the drainage area study programme and company action.

The numbers of Intermittent Discharges have changed through 2007-08 as:

| | |
|---|---|
| 2006-07 return | 3508 |
| Net addition | 68 |
| 2007-08 return | 3576 |

In the course of the harmonisation programme and by investigation for investment 29 Unsatisfactory Intermittent Discharges were removed. However, 135 of the new discoveries were found to be unsatisfactory and changes to the numbers of UIDs are:

| | |
|---|---|
| 2006-07 return | 846 |
| Added for better information | 58 |
| Removed by better information | 8 |
| Net addition for better information | 50 |
| Removed by company action | 40 |
| 2007-08 return | 856 |

We reviewed the sign-off documents for 2 UIDs.

*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 private, Aquatrine (MOD) and PPP assets.

Records are now limited to MEICA 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.

The report for 2008 excludes failures on sewage treatment works, which were included in previous years. Scottish Water has re-run the WAMS extraction query on the 2006-07 data, and the comparative number would have been 7725.

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 examined works orders records included in the 2008 report number. We found cases where the works ordered or the work actually carried out should not have affected customer service, for example replacement of an operating valve or connecting a pump. It may be that these tasks did affect customers, but the WAMS coding is inadequate to provide the information.

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*

This data was a new requirement in the 2007 return and the methodology is the same, excepting that data is now confined to SEPA regulatory and formal samples. Scottish Water re-ran 2007 data set to the same condition and demonstrated negligible differences.

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 rolling 3-year information obtained from SEPA for regulatory sampling in 2005, 2006 and 2007: as SEPA's data is calendar year related, these lines are reported on that basis. The company has rejected annual works data sets for a parameter where there are less than six sample results in a year.

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 and more 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.

Scottish Water's WwTW performance has improved in most lines.

- The 3 year rolling data set tends to smooth out strong changes.

- SW's investment programme and operational changes should drive improvements.
- The procedure depends on long-term consistency in SEPA's sampling and WwTW licensing policies.

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**Comments by Line**

Line 10: The methodology for determining sewer collapses is the same as in previous years 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.

Line 11: The sewer length calculation is as per Table D6.

Lines 12, 13: This is the number of intermittent discharges and is comparable with last years figure. Previous years' figures were not comparable with WIC's definition requirements.

Line 14: This is a calculated field.

Line 15: Excludes blockages that caused flooding.

.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. This year's reported data excludes sewage treatment works equipment failures and is not comparable with 2007 figures.

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 to 19: We agree with the confidence grade of B3.

Lines 20 – 37: In so far that Scottish Water is reporting numbers based on an analysis of SEPA's public domain data, a confidence grade of A3 seems reasonable.

## 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. 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 prepared in 2008. The plan have not yet been approved by SEPA.

- Scottish Water has adopted a target Level of Service for a drought order of once every 40 years in any water resource zone. The LoS has been discussed with SEPA, who, we understand support it, but the Scottish Executive has yet to formally agree it.

- Scottish Water drafted a Water Resource Plan and submitted it to SEPA for approval. The plan included an assessment of the impact of the implementation of the Birds and Habitats Directive and the Water Framework Directive, but it did not take account of climate change.

- Outage allowances have been reassessed for 38 Water Resource Zones based on a contractor's report issues in February 2008. The revised allowances range from 0.06% to 1.06% with the values for the two large zones being 0.05% and 0.06%. The WRP06 assumed values for these zones were all 5%. Treatment works outage for 30 works within the zones was also estimated at between 0% and 1.55%. Zone specific allowances have been used where available.

- For zones not covered by the February 2008 report, generic allowance have been used, namely; 0.5% for WRZs less than 1 Ml/d DO, and 3.0% for WRZs greater than 1 Ml/d DO. figures Recognising that there is insufficient statistical data to derive a significant value for zones with DO greater than 1 Ml/d we believe that it is a weakness that site specific factors have not been addressed particularly for the larger zones and works for which an outage allowance applies; 3% may be material where zones are marginal.

- Scottish Water has no information on losses from the raw water transmission mains and continues to apply an assumed overall average leakage of 21 $m^3$/km/day. The data for the water balance for AR08 implies that trunk main leakage is about 10 $m^3$/km/day. From our experience we would expect generic figures for trunk or transmission mains leakage to be less than from a distribution network.

- The raw water abstraction flow meter installation programme (WR5 driver) is due to be completed in 2009, after which Scottish Water proposes to evaluate transmission and treatment works losses from the difference between meter readings. Although the meters should allow much better estimates to be made

of overall raw water losses there will still be calculation uncertainty in the split between transmission and works losses. We recommend that whenever possible Scottish Water monitors the difference between these meters and DI meters to better understand these losses

- Site specific treatment works losses as a percentage of Deployable Output are generally significantly lower than the generic assumed values. The relatively high generic figures could result in the DO being underestimated which could be significant, specifically for the zones supplied from the 52 larger capacity works.

- We suggest that Scottish Water analyses data for the range of works capacities and processes within their asset register and assesses whether the use of outliers and site or capacity specific data should be included in any calculation of average losses used in other zones. The omission of the outliers would more reasonably reconcile Scottish Water's estimation of outage with our information. We believe that further objective data and analysis is required on this important parameter.

- There is relatively small inconsistency between Table B9 and Table A2 in that the total average resident population in the water resource zones is reported to be 4,974,903 whereas in table A2 line 1 the winter population is reported as 4,978,553. This difference has been described in our commentary for LineA2.12 above.

- Critical period analyses have been completed for 20 WRP08 zones in line with SEPA's guidance for 2006 and the EA's "Water Resources Planning Guidance", April 2007. Where the critical period has been assessed as the ADPW (35 zones in supply/demand deficit), SW has assumed that planned and unplanned outages would not occur.

- Scottish Water continues to assume a 3% increase in demand for the dry year critical period. This may be correct in Scotland but is lower than we have sometimes seen in England and Wales. We recommend that Scottish Water checks further to ensure that this parameter has been accurately assessed.

- 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. As we stated in our report for the previous return, 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.

- The Critical Period SOSI in 2007/08 is -26 implying that 44% of Scotland's population (2,174,033) are in deficit. The index for the Dry Year Annual Average is -19. (37% or 1,840,714 of the population).

- Uncertainty in the estimation of some of the inputs to the analysis (such as treatment works losses and raw water main losses) lead to uncertainty in the deficits in some areas and hence the SOSI score. This can be material where deficits are small.

**Scope of the audit**

We held five meetings with the staff of Scottish Water's Water Resource Planning /Water Framework Directive Team (on 15, 16 and 17 April and 1 May) to audit the available calculations for Table B9 the for the 1st draft BP. We understood the basis of the current situation with water resource planning in Scotland. Completed tables were not available during the audits although some lines within tables were available in draft only. Generally therefore it was only possible to understand and audit principles, methodologies and assumptions. The calculations for 4 lines were audited in detail, namely Fife Megazone Campbeltown, Fife, Gareloch with Inveradale and Howdenwells and Manse Street Water Resource Zones

The SOSI calculation was calculated for 'Planned level of service' (Table B9a) and for 'Critical period level of service' (Table B9c). Table B9b is titled Security of Supply Index – Reference level of service is blank as agreed with WIC.

**Water resource planning in Scottish Water**

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 B9 in previous years on the supply side comes from those studies.

Since SR06, SEPA has provided guidelines for the development of water resource plans. The specification is similar to that being adopted for plans being produced in England and Wales. Completed plans are submitted to SEPA for approval. The first 'draft' comprehensive WRP was submitted to SEPA in May 2008 and is currently undergoing the statutory consultation process. Following this process the 'adopted' WRP will be issued.

The guidelines for the plans take account of the Water Framework Directive, the Birds and Habitats Directive and the CAR licensing system that has been implemented since the last Strategic Review.

Using the SEPA guidelines, Scottish Water has assessed that 132 zones are currently in deficit according to supply-demand balance calculations based on Critical Period Demand and national criteria. 97 are calculated to be in deficit based on Dry Year Annual Average Demand. Roughly half of these deficits are due to water availability and half due to lack of treatment works capacity. These studies have also identified up to 60 zones with potential supply/demand balance issues where leakage reduction will be of significant benefit. Further studies addressing leakage to be completed by October will refine the list.(including LRELL modelling due for submission to WIC in December).

Current studies to assess the impact caused by implementation of the Birds and Habitats Directive and the Water Framework Directive will not necessarily resolve existing level of service problems.

The effect of climate change is not included in final supply-demand tables because SEPA wants Deployable Output (DO) to be quoted for non-climate change scenarios. In

Scotland generally, climate change is predicted to result in drier than current conditions in only two months of the year (July and August). Thus only the DO of river intakes of small storages with very short critical periods will be reduced. The yield of large storages may increase. So too will groundwater recharge. Climate change is not therefore regarded as a big issue in Scotland.

In parallel to the work on the water resource plans Scottish Water is currently working to calculate an Economic Level of Leakage (ELL), the final ELL being available in December 2008. Many of the water resource zone supply demand deficiencies rely on leakage reductions to improve the balance. In practice until Active Leakage Control is implemented linked to the ELL, there will be uncertainty that theoretic reductions will in fact be delivered.

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. SW reports that while the 1:40 level of service is incorporated in England and Wales reference level of service so are hosepipe bans and other demand reductions that have not been adopted in Scotland. SW further reports that WIC has agreed that the reference level of service need not be completed.

**Methodology**

*Scottish Water's levels of service*

Scottish Water has used the following planned Levels of Service (LoS) in tables B9a and B9c.

- Scottish Water has adopted a target LoS for a drought order of once every 40 years in any water resource zone. This is similar to the reference level in England and Wales, although companies can have different levels of service. SEPA has supported the proposed target LoS although we understand that Scottish Executive has yet to formally sign it off. SW has not supported the change with any economic justification but regards it as a rationalisation of its previous practice of having different levels of service in large and small WRZs. We believe that a common level of service is equitable.

- Scottish Water has not defined a LoS return period for hosepipe bans saying that they will only be implemented "once the process to apply for a Drought Order has been initiated" and does not intend to implement rota cuts or install standpipes since there is no historical evidence of the need for their use. Therefore there is no target return period for either measure.

*Numbers of water resource zones*

Scottish Water has 239 water resource zones (WRZs) in its company area supplied by more than 500 sources. Some of these comprise single sources supplying just a few

properties in remote areas. This is double the total number of WRZs in England and Wales and therefore makes the work of producing water resource zone plans onerous for a single company.

*Deployable output and water available for use (WAFU)*

General

'Water Available For Use' (WAFU) is defined as (*Deployable Output – Outage*)

Deployable output is constrained either by licences set by SEPA, or by hydrological considerations or by raw water infrastructure both with an allowance for raw water transmission losses and WTW losses or by WTW capacity.

The HYSIM-Aquator 'behavioural analysis' yield assessment tool, developed by Scottish Water has been used to evaluate WAFU at most major demand centres (water treatment works) served by large surface water reservoirs. SW has developed 43 HYSIM-Aquator models covering 251 sources in more than 43 Resource Zones and are said to account for approximately 80% of the Company's total output, the other 20% (mainly small resource zones) being based on an analysis of rainfall data and other information using other "Low Flow Estimation Systems".

Yield and licence with an allowance for losses, is reviewed against available treatment capacity and the lowest figure taken. This is then further reduced for outages if the WRZ is considered to have an annual average critical period.

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 further changes as abstraction monitoring becomes more comprehensive and over abstraction is addressed.

It is understood that Scottish Water is currently planning to extend its own monitoring network to supplement the gauges already operated by SEPA. 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. This work to date has been used to update deployable output calculations and incorporated into Table B9.

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.

Outages

In WRP06, outage allowance was assessed by adopting a percentage allowance based on consultants' experience of working with Water Companies in England and Wales. In WRP08, Scottish Water sought to improve the estimation of the outage allowance and adopted the approach outlined in the UKWIR report "Outage Allowances for Water Resource Planning", 1995. For the Draft Water Resource Plans, Scottish Water

commissioned a contractor to analyse outage data for 38 WRZs in pilot studies across 7 geographical areas. The report, dated February 2008, concluded that 95%ile outage allowances ranged between 0 and 4.38% compared with the WRP06 assumed values of between 5% and 10%. Of the 38 zones, 9 zones have deployable output greater than 10 Ml/d and 2 zones over 100Ml/d. The outage allowances range from 0.06% to 1.06% with the values for the two large zones being 0.05% and 0.06%. The WRP06 assumed values for these zones were all 5%. Treatment works outage for 30 works within the zones was also estimated at between 0% and 1.55%.

Seven treatment works in the study have deployable output greater than 10 Ml/d, one being over 100Ml/d; the majority of which the outage allowance was between 0% and 0.23%. The WRP06 assumed values for these works were between 3% and 5%.

As there was limited reliable outage data available, the analyses were based on workshops (7 in total, covering multiple zones) in compliance with UKWIR guidance on outage assessment. Whilst expert knowledge of local operational staff was captured to determine the parameters required to estimate outage, a degree of subjectivity is also inherent in the method.

Thirty two of the 43 zones where outage is applied have DOs over 1 Ml/d with 19 greater than 10 Ml/d.

Scottish Water has assumed that the estimated outage value will be used for zones/works included in the study, but for other zones not included in the study:

- 0.5% outage value for WRZs less than 1 Ml/d DO, and
- 3.0% outage value for WRZs greater than 1 Ml/d DO.

These values represent a reduction from the 5% to 10% of WAFU used for previous returns.

Recognising that there is insufficient statistical data to derive a significant value for zones with DO greater than 1 Ml/d we believe that it is a weakness that site specific factors have not been addressed particularly for the larger zones and works for which an outage allowance applies; 3% may be material where zones are marginal.

Benchmarking with other companies published information indicates a wide range of figures from a low of around 0.5% to a high of 8% or more.

While therefore we cannot say that SW's allowances are wrong we recommend that Scottish Water extends the works outage analyses to include larger zones and works and to establish an outage information acquisition procedure and database to enable future comprehensive analyses to be completed.

Critical Period

Scottish Water has completed critical period analyses for 20 WRP08 zones in line with SEPA's guidance for 2006 and the EA's "Water Resources Planning Guidance", April 2007. Currently, the critical period for the majority of Water Resource Zones is either the Dry Year Annual Average Demand (DYAA) or the Average Day Peak Week

Demand (ADPW), the category being determined by the availability of raw or treated water storage. For three zones where Scottish Water assessed there to be sufficient storage to move away from ADPW but not sufficient to allow use of DYAA, the Average Day Peak 3 Months was selected as the critical period.

Where the critical period has been assessed as the ADPW (35 zones in supply/demand deficit), SW has assumed that planned and unplanned outages would not occur. In the case of planned outages we concur as maintenance would be planned around critical periods. Previously we have commented on the application of unplanned outages occurring in the period of the peak week demand. As detailed above Scottish Water has completed a study of outage that confirms the low incidence of unplanned events. While it is true that unplanned outages are unlikely to occur during such a short critical period it is still possible.

Raw water transmission losses

Scottish Water has no information on losses from the raw water transmission mains and for water balance and SOSI calculations continues to apply an assumed overall average leakage of 21 m3/km/day; the figure having been derived historically for potable systems. The data for the water balance for AR08 implies that trunk main leakage is about 10 m3/km/day. From our experience we would expect generic figures for trunk or transmission mains leakage to be less than from a distribution network.

The calculation includes a length factor (increase) and pipe size and works capacity factor (increase or decrease). The estimated leakage from transmission mains must be considered uncertain. The estimates imply significant leakage in relation to the Distribution Input for some smaller resource zones that may be overly pessimistic and thereby distorting the water balance.

The raw water abstraction flow meter installation programme (WR5 driver) is due to be completed in 2009, after which Scottish Water proposes to evaluate transmission and treatment works losses from:

Metered abstraction – Distribution Input = (Transmission pipe + Works losses)

Scottish Water reports that the majority of meter sites have been surveyed and meter installation will commence soon. No new data are available to improve the estimates for the 2008 water resource plan. Although the meters should allow much better estimates to be made of overall raw water losses there will still be calculation uncertainty in the split between transmission and works losses; with the potential for assumptions relating to say treatment works losses resulting in over or underestimates of transmission mains losses.

Water treatment works losses

Water Treatment Works (WTW) losses are assessed either using a table of losses for a range of generic treatment processes, or from treatment works specific "measured" losses, or following a works visit by an asset planner for a zone plan. The generic values are similar to those used in 2007, but with losses from spiral membranes and tubular membranes reduced. Scottish Water has presented evidence to support treatment works losses for coagulated filtration of 10% (range of works DO, 0.4Ml/d to 19 Ml/d), spiral

membranes of 28% (range of works DO, 0.046 Ml/d to 1.323 Ml/d) and tubular membranes of 29%.(range of works DO, 0.015 to 0.45 Ml/d), The data for the membrane losses relate to very small capacity works. Taking into account works capacity the weighted percentage losses for the three categories would be 6%, 19% and 28% respectively. All the generic figures appear high and are greater than we have observed elsewhere, although the weighted percentage losses for coagulation filtration and spiral membranes are more in line with our information.

The asset register reports 333 treatment works of which 18 are abandoned, 114 are less than 0.2 Ml/d capacity and 52 are greater than 10 Ml/d capacity. Generic values have been used for the majority of works, based on the treatment processes on the site. For seven works, site specific losses were used and for a further 9 works the generic value was modified based on information available at the time. Twelve of the 16 adjustments reduced the assumed losses including at four works supplying Edinburgh and Lothians.

The relatively high generic figures could result in the Deployable Output being underestimated which could be significant, specifically for the zones supplied from the 52 larger capacity works.

We suggest that Scottish Water analyses data for the range of works capacities and processes within their asset register and assesses whether the use of outliers and site or capacity specific data should be included in any calculation of average losses used in other zones. The omission of the outliers would more reasonably reconcile Scottish Water's estimation of outage with our information. We believe that further objective data and analysis is required on this important parameter.

*Dry year distribution input*

Average daily distribution input (DI) is used as the denominator in the headroom calculation. As for previous returns Scottish Water has taken the DI increased by 3% for a dry year. This is consistent with the water resource plans. The dry year average day peak week is calculated by applying a peak factor to the dry year average DI. The peak factor has been calculated from DI flow records for each treatment works.

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. We would like to see an analysis of DI over a number of years to confirm the 3% currently assumed.

*Target headroom*

For the 2008 Water Resource Plan, Scottish Water commissioned a contractor to report on headroom uncertainty for 20 water resource zones. The zone studies adopted the 2003 UKWIR Methodology (An Improved Methodology for Assessing Headroom). 2010 Target headroom uncertainty including and excluding supply side climate change both vary between 4% and 12% of WAFU. The higher factors tend to be for the smaller and rural zones.

Target headroom for the remaining zones has not been reassessed and the factors derived using the 1998 UKWIR methodology at the megazone level have been used. The

megazone analysis results in a 2010 target headroom range of between 6% of WAFU for the larger water resource zones of the Central Belt to 9% for the rural and smaller zones. These factors are generally slightly lower than those calculated by the 2003 methodology.

As we have previously commented, from our experience these factors are not unusual, although we would not expect all small zones necessarily to have high headroom factors. Overall, we believe that the chosen headrooms are acceptable for the current calculations.

Apart from where the sensitivity of supply side climate change has been considered for the 2003 factors, Scottish Water has stated that its calculations do not include a specific allowance for climate change, although the 1998 methodology does include such an allowance. 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. Although the impact of climate change for Scotland may be very different to that expected in areas of England and Wales this omission represents an uncertainty for all resource assessments. 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. Further detail on the population calculation is given in the commentary for Table A.

There is inconsistency between Table A2 and Table B9 in that the total average resident population in the water resource zones is reported to be 4,974,903 whereas in table A2 line 1 the winter population is reported as 4,978,553. This difference may be for the same reason described in the commentary for LineA2.12 above. If so, there must be an opportunity for integrating the AR reporting teams or closer coordination to ensure that common data are consistent.

*The SOSI analysis*

The Scottish Water methodology for calculating the Security of Supply Index (SOSI) is similar to that used in previous years. We have reviewed the calculations of SOSI and believe them to be consistent with industry best practice and with Ofwat's letter RD03/02. The Critical Period SOSI in 2007/08 is -26 and the Dry Year Annual Average Index is -19. These indices imply that 44% of Scotland's population (2,174,033) are in deficit based on the critical period and 37% (1,840,714) of the population in a Dry Year.

Uncertainty in the estimation of some of the inputs to the analysis (such as treatment works losses and raw water main losses) lead to uncertainty in the deficits in some areas and hence the SOSI score. This can be material where deficits are small.

**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. The HYSIM-Aquator 'behavioural analysis' yield assessment tool 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 to improve the quality of some data and validate some assumptions used.

- 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 sometimes seen in England and Wales. We recommend that Scottish Water checks further to ensure that this parameter has been accurately assessed..

- 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 consider that some of the estimates of losses are high. Although Scottish Water is currently installing flow measurement on many of its intakes, it is still important to understand the components of the water losses. Monitoring the difference between these meters and DI meters alone may not be sufficient to understand the source of losses particularly where generic production losses and transmission main losses are used.

- Table B9 will continue to be subject to volatility as SEPA finalises revised abstraction licences, addresses the implications of the Water Framework and the Habitats Directives on abstraction rates and provides guidance on how to deal with climate change.

Scottish Water notes the uncertainty surrounding a number of its uplift factors mentioning specifically outage, headroom and dry year demand allowance. It further states that "We do not consider the 29% of the population in Scotland which we calculate to have <-10% deficit to be at significant risk. Our focus for WRP08 has been on the 15% of the population with >-10% supply deficit". We concur with this view.

# 6. SECTION D – ASSET INFORMATION

## 6.1 Overview

Section D gives information on asset information. Our responses in each table give full information, including key points.

## 6.2 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.
- The tables report 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.

### Comments 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 collected information on commissioned assets directly from project teams and other areas of the business. The reported information includes Q&S2 completed projects and Q&S3a projects.

A spreadsheet was issued for completion with drop-down menus to assist completion and assignment to asset types and size bands. At the same time the existing asset inventory was issued to the project managers and others to allow cross-checking with the existing asset stock. Returns were checked and any queries resolved before data were collated and entered directly to tables D1 to D3. Project managers and others were also asked to make adjustments for any under- or over-reporting in previous years.

Data on operations reactive maintenance were collected from PeopleSoft and WAMS. Difficulties reported by Scottish Water in collecting this data in previous years have eased slightly due to focussing the collection of the data through a single team and the provision of guidance on matching assets to asset codes. Some source data still cannot be accurately matched to assets in this area but the value is small. Another area where data are believed to be incomplete relates to the 'Quick Hits' programme. These inconsistencies are reflected in confidence grades.

Sample checks were made on the base data, which showed that Tables D1, 2 and 3 had been correctly compiled from the base data.

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.

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.

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. A slight lag is inevitable between actual project commissioning and the entry of data into the tables, so the tables may not fully reflect the year's commissionings. This effect will be repeated each year.

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. Size bands used are compatible with those used in Table H. MEAV summaries are compatible between Tables G and H. When calculating the MEAV of a newly-commissioned asset the whole project cost is used, being allocated to quality or enhancement drivers. This effectively writes off the whole value of the replaced asset, but does not make any allowance for a potential reduction in MEAV, for example where a water treatment works is abandoned and a mains connection made. This is compatible with the approach taken for Table K56 in AR06 and with practice in previous years, but Scottish Water intends to make further improvements in the process for future reporting years.

Due to the change in format in Tables G5 and G6, from AR07, there is no longer a risk of double counting of Support Services assets, since these are reported separately in Table G3 and not apportioned to water or wastewater services. Guidance on the entry of figures for air-valves was checked and seen to have been properly applied.

Information reported in H tables is generally consistent with the D tables and takes into account newly commissioned assets. However the source data for H tables is drawn principally from GIS and Ellipse and so is dependent on timely updating of those systems following the commissioning of a new asset. Comments on this issue are provided in the commentary on Table H, below. Information in Tables D1-3 relates to the commissioning of assets, rather than sites. Individual sites may consist of many assets and there may be many assets commissioned on a single site in a year, so for assets other than pipes numbers in the D and H tables cannot be directly reconciled. For example, line D1.36 reports the commissioning of 44 assets at type SW2 water treatment works during the report year. This

exceeds the total number of type SW2 water treatment works, which is 29 (Table H, line H2.3 – operational at year-end).

**Comments by Line**

Lines D1.47-8: It was noted that no new (as opposed to replacement) air-valves are reported at line D1.48. This is not believed to be the case and Scottish Water proposes to address the reporting of this item in future years. The costs of new air valves are included in line D1.47.

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.

**Comments on Confidence Grades**

The company generally reports a B3 confidence grade for this data. The confidence grade allocated to water treatment works data has been improved to B2 from B3 in AR07, reflecting improved allocation to works type and size band due to improved guidance being issued to project managers and others. 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. Confidence grades for telemetry assets (lines B3.9 and 3.29) have been reduced this year because of known missing data. We believe that the assigned confidence grades are 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.

## 6.3 Table D5: Activities - Water Service

### Commentary by REPORTER

### Introduction

*Key points:*

Table D5 was 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 prior to AR07.

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.

Scottish Water's closing balance of mains length is derived every year from the GIS asset information. Last year's backlog of contractor data has been cleared.

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.

Further progress has been made during the report year and by the end of the report year Scottish Water had set up all its DMAs giving a total coverage of 94% of population. In AR07 it was reported that 70% of the Scottish population was covered by a valid DMA. The figures reported in the table relates to the year end position and not an average position.

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. Scottish Water states that an 800 km backlog, mainly of renewals, at the end of 2006-07 has been cleared and that any records not on GIS are down to current production.

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 information reported is sourced from Scottish Water's leakage control management system "Perform Spatial +" (PSP)

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, Scottish Water has completed its programme of DMA establishment. 770 additional DMAs were set up in the reporting year compared to 171 additional in the previous year. The current figure of 2626 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**

Line 1: The opening balance of mains length is equal to the closing balance from AR07, Line D5.8.

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.

Lengths given are derived from as built records.

Lines 4 & 5 The length of mains cleaned is assessed from WAMS job codes. Although the length is a reasonable assessment, WAMS resolution codes do not provide full confidence because site information can be incomplete or different from the initial works order.

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. Lead communication pipes were replaced after requests from customers and in conjunction with the mains rehabilitation programme.

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 be temporarily in Categories 2 or 3 at any time. The position is at the year end; it does not represent an "average" for the year.

Line 13: This line reports the number of DMAs fully validated and handed over during the year. This is the same as the difference between line 12 for the reporting year and the previous year.

Line 14: This line is a snapshot at a point in time and represents the number of DMAs in a Category 1 condition at the point in time. This shows that at the time in question 82% of Scottish Water's DMAs were operable, a reasonable figure.

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.

The figures include for some larger DMAs (called super DMAs) and small water supply zones. All companies have some "super DMAs".

The use of small water supply zones has been discussed at the Leakage Regulation Group and are 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 is, as expected, lower than that at Line 16, where percentage properties are used as a surrogate for percentage population.

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). The reported percentage is significantly lower than that reported in line D5.16 because many trunk mains and other associated mains are not covered by DMAs.

**Comments by Confidence Grade**

Line 1 We note that the confidence grade has been allocated an A1 grade compared to last years closing balance of A2. While data cleansing will have been carried out this is reflected in Line D5.7a, other changes. We believe that the confidence grade should remain at A2, the same as reported at AR07 closing balance.

Lines 2 & 3 Lengths taken from contractors' returns, and we believe that the grade of B2 is reasonable.

Lines 4 & 5 Lengths taken from WAMS where resolution coding could possibly be improved; a grade of B3 is considered reasonable.

Lines 6 & 7 Again Lengths taken from contractors' returns, and a grade of B2 is considered reasonable.

Lines 7a & 8 Line 8 is taken directly from the GIS for water infrastructure assets. Last year we accepted a grade of A2 and have no reason to change our view. The grade of B2 may therefore be cautious. Line 7a includes an element of balance between the GIS trawls for AR07 and AR08, and a confidence grade of B2 seems reasonable.

Lines 9 to 11: Lengths include those replaced by reactive operational work recorded on WAMS. They have been upgrades from last year's B3. For lines 4 and 5 we noted that mistakes can be made in resolution codes suggesting the

B3 is reasonable. We do accept that replacement of communication pipes should be less prone to error and on this basis accept the grades suggested.

Lines 12 to 18: 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

Scottish Water has increased the confidence grade to A1 in Line 13. This is accepted.

## 6.4 Table D6: Asset Performance and Activities – Wastewater Service

### Commentary by REPORTER

***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 includes 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 balances for the total lengths of sewer and critical sewer are the closing balances reported in table D6 lines 13 and 8 respectively in the 2006-07 return.

- The closing balances for the total length of sewer and critical sewer are the figures repeated in E7 lines 8 and 13 respectively.

### Methodology

The report on critical sewers is in several parts:

1. A critical sewer balance, - opening balance, closing balance, new critical sewers added during the year.

2. A report on the length of sewer assessed either by CCTV or man entry.

3. 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 line 8 of this table 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. Project managers determine whether sewers are critical or non-critical, moderated by Scottish Water based on the 450mm diameter criteria.

In 2007-08 Scottish Water cleared a backlog of 400,000 manhole survey work into the GIS system. The new information about sewer depths moved around 400km of non-critical sewer into critical status.

The length of critical sewers inspected throughout the year has come from several sources. The sources are: planned work from the CCTV data base, data from CCTV contractors, CCTV work from WAMS (and GIS).

In 2006-07 sewer replacement lengths were reported using data from several sources: operations reactive data, the CID programme, Scottish Water Solutions and the Project Closedown Programme. This year the data was collated centrally by Scottish Water and the figure reported.

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 from the GIS data. We commend Scottish Water for taking this fundamental approach on a year by year basis (rather than relying on adding or subtracting changes to last year's figures).

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 about 16,000 km representing lateral sewers which are assumed to exist but are not included in the asset inventory. The methodology was first carried out in the AR06 return and the same process carried out in AR07 and again this year. There are two unresolved problems around this methodology:

- Whilst 1000 km of main sewer was reasonably added (assumed to exist but not recorded) in 2006, any new discoveries are added into the GIS without a corresponding reduction in the 1000 km allowance. No account has been made for this.

- The estimate of around 16000 km of lateral sewers was based on a relatively detailed investigation into dwelling types etc. from local authorities in 2005-06. This was repeated in AR07 and this year. However, the initial investigation was based on a statistical approach of the likely length of lateral sewer per dwelling of each type. Intrinsically the number should not change with time, so recalculation should be unnecessary. In fact, recalculation has produced a greater length, probably because houses have changed status – for example the division of properties into apartments – which can have little effect on the sewerage length. Around 400 km of possibly unsubstantiated sewer length was added this year.

We recommend that Scottish Water review these two procedures, which will otherwise increasingly corrupt the quality of the return data.

**Comments by Line**

Line 1: This is the figure reported last year as the closing balance of all sewers in Line 13.

Line 2: This is the figure reported last year as the closing balance of critical sewer in Line 8.

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.

39km of new critical sewer were added this year compared to 22 km 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 4.59 km of renovated sewer lengths this year.

Lines 6 and 11: Scottish Water is reporting a total replacement length of 10.56 km for Critical and 46.85 km for non critical sewers.

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 include the re-classification of around 400 km of sewer from non-critical to critical status, plus 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 11456 km, which is based on GIS at the year end.

Line 13: The closing balance of 49762 km 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 assessment of confidence grades is a difficult and possibly subjective area. We accept Scottish Water's assessment this year, with one exception:

Line 12a. The volatility of this line arising from recalculating the length of lateral sewers is incidentally disguised in AR08 by the transfer of a similar

length to critical status for a different reason. We suggest confidence grade B3 at best.

***Lines 14 to 19; studies***

**Introduction**

*Key points*

- Scottish Water has 805 drainage areas. None of these are reported as having completed drainage area studies. Scottish Water has identified 68 drainage areas for study in the current programme of which 58 drainage area plans are ongoing in the current programme. Only 56 are reported as ongoing as 2 out of the 58 are exclusively SR10 early start, so have not been counted in this return.
- 6 of the 805 drainage areas are reported to have a status of "no maintenance required".
- 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. In AR07 it was reported that Scottish Water had previously undertaken 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.

Scottish Water is now looking to rationalise the drainage area study zone boundaries with phase one of two now complete. The boundaries will be based on the catchment area draining to a particular Sewage Treatment Works, giving an improved understanding of the population and distribution as well as subsequently assisting in the management of the treatment works. This would introduce the potential for joining previously separated catchment models. The revised boundary structure is thought by Scottish Water to be ideal comprising a live document which changes as the network load changes with development and other evolution within the catchment.

It is considered that the update will provide Scottish Water with an accurate representation of system loading but that it will also introduce increased workload to simply maintain the drainage boundary data.

Scottish Water reports that it has not completed any drainage area studies in the past year. It has, however, reported 6 studies in the category of "No Maintenance Required". It may therefore be reasonable to assume that these DAPs could be considered to be complete. There are also 55 currently underway, 109 to be updated and 635 new build studies reported.

The individual drainage area zones listed may only form part of an overall defined drainage area. Within the drainage area zones reported, there are a number with multiple studies.

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. In line with this thinking, a number of studies have been identified for update. The extent of these updates varies from desktop study to full verification.

Two drainage area studies which are currently underway were reviewed during this audit. It was seen that the process for carrying out the study has been followed with appropriate reporting at each stage.

However, there did appear to be inconsistency between the audit results and ultimate model usage for one of the studies reviewed. The needs assessment is dependent on historic verification of model results to enable hydraulic needs to be determined. In this particular model reported flooding problems are not well replicated by the model leading to audit failure on this point. Despite this issue, the model results seem to have been used through to options stage with some options being constructed and subsequently being added to the model during model maintenance This could have led to over design of option schemes through the use of inaccurate model results. Based on this example we recommend that the project review process following model auditing should be revised to ensure that only correctly built models are used for any particular purpose.

The second of these DAPs consisted of a scoping study completed in 2001, a model build and verification study which was completed in 2003, and a needs study. The needs study not only includes the drainage area zone described in the model build and verification report but three additional catchments. No Options study had been carried out. The four catchments were modelled individually up to the needs study stage. The reports reviewed follow the DAP approach consistently.

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. In general, the studies reviewed are considered to be adequate for this purpose.

SW's current DAP specification covers all studies regardless of category. The specific UID methodology document feeds into the overall DAP specification. Until last year, DAPs were completed under the SIIOP specification. This was the first draft of the specification combining those of the previous three water companies. It has since been reviewed and updated with the current version completed in 2007. New studies completed from now on will follow the current version of the specification.

**Comments by Line**

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 in the current programme is returned as 68 drainage areas, of which 53 drainage area plans are currently underway, 5 have been identified for update to existing studies and 10 are new studies.

Line 16 The number of studies on-going is reported as 56. There are 58 on-going studies but 2 of these are exclusively SR10 early start so have not been counted here.

Line 17: Scottish Water has taken the definition of this line as studies completed in the reporting year. Drainage area studies completed has been reported as zero.

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**

Line 14: Confidence grades have changed from last year. Scottish Water reports a confidence grade of B2 because of where the data is held. The data is kept in non-corporate tables, which may be copied and held in several locations. We consider that this grade is acceptable.

Lines 15 to 19: Scottish Water reports a confidence grade of C2 for these lines due to fragmented nature of projects. Studies are currently commissioned by several different areas of the business. Programme information is held in different non-corporate systems and may not be returned to Asset Studies at the end of the study. Again this confidence grade is considered to be acceptable.

## 6.5 Table D7: Wastewater Capital Maintenance Expenditure

### Commentary by REPORTER

### Introduction

*Key Points*

- The same methodology has been used to compile Tables D7 and D8. The methodology is consistent with that used for AR07.
- 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, using an assessment of the actual cost of meeting each driver.
- Scottish Water has reported on the basis of 8 operational areas.
- The table shows expenditure made on all projects in the year 2007/8, rather than expenditure on projects commissioned in 2007/8
- The correct allocation of projects to categories has been confirmed by audit.
- Scottish Water has written rules for proportional allocation of capital costs to project driver codes and these appear to be reasonable. In sample checks one discrepancy was observed in the application of these rules to a project. It is believed that this relates to allocations made before the current rules were codified. It is recommended that Q&S3 projects with a capital maintenance element are reviewed to ensure that costs have been correctly allocated to drivers.

### Comments on Methodology

The methodology used by Scottish Water is essentially the same as that used in AR07, with some changes made to improve the accuracy of allocation of projects to operational areas. Data was downloaded from the Capital Investment Management System (CIMS) into a single database for Q&SII projects and Q&SIII projects, immediately after the freezing of financial data in early April 2008. 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. For AR08 project managers were given written guidance and also drop-down spreadsheet menus to assist them in allocating projects with any capital maintenance element to operational areas and defining asset categories.

Owing to changes in operational boundaries and an increase in the number of operational areas from 4 to 8, comparisons cannot be made with previous year's D7 table. During the audit, Table D7 was reconciled with Tables D3a, D3b D4a and D4b, from which it was compiled.

*Allocation of projects to operational areas*

Reporting is on the basis of 8 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. During 2007/8 the boundaries of operational areas have been rationalised so that they coincide with Council boundaries. This improves the accuracy of matching projects to operational areas and also reduces the number of linear projects which cross boundaries.

As part of the data collection exercise project managers were asked to define the operational area for each project. For Scotland-wide projects, project managers apportioned total project cost to the relevant operational areas. For linear projects (such as sewers) crossing operational area boundaries project managers were also asked to apportion cost to the relevant 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 at CAPEX1 stage, 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 however been revisited during the year for completed Q&SII capital maintenance projects. 42% of Q&S2 projects (as reported in Table G5) have more than one driver and so have proportional allocation applied.

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. 29% of Q&S3 projects (as reported in Table G6) have more than one driver and so have proportional allocation applied.

*Rules for Proportional Allocation of Project Costs*

In January 2008 Scottish Water prepared a guidance note on capital expenditure allocation. This is understood to have been submitted to WICS for approval, which has not yet been confirmed. All projects are assessed for the percentages to different capital drivers at CAPEX1 stage. The guidance notes require that the allocation of project costs to drivers is revisited at each CAPEX stage, but with an exemption for projects with values below £100,000. This is because these small projects often progress directly from CAPEX1 stage to construction.

A small sample of projects was reviewed to illustrate the application of the rules, as follows:

*Ardrishaig WTW (30023).* This WTW improvement project includes both capital maintenance and water quality improvement drivers. A review of the project content and the cost of the various elements showed that cost had been correctly allocated to drivers, with capital maintenance renewal (driver WSNI) accounting for 37% of the total project cost, and the remaining 63% of cost being correctly applied equally to three water quality drivers (drivers DW2 – trihalomethanes, DW4A – cryptosporidium and DW13 – aesthetic). Costs were split equally between the three water quality drivers as the same process improvement will deliver improvements for all three drivers.

*Dalbeatties Port Street Pumping Station Refurbishment (31911).* This pumping station improvement consists of a new storage tank with telemetry and the replacement of 140m of asbestos cement sewer. The latter is to be upsized to cater for growth. The cost of the tank element had been correctly allocated to the capital maintenance driver (68.3% to WWNI). However it was observed that the cost of the sewer element had been allocated equally to the growth and capital maintenance drivers (15.85% to each of WWI and SG1). This differs from Scottish Water's guidance document, which requires costs to be apportioned in such cases in proportion to flows with and without growth.

*Castle Douglas WWTW Growth (34641).* This WWTW improvement project for growth also has odour and capital maintenance drivers. The costs of the elements of the project were seen to have been correctly allocated to odour (21% for cost of odour plant, to driver CS2), capital maintenance (6% for refurbishment, to WWNI) and growth (73% for upsizing, to SG1).

A review of the allocation of costs to drivers for Q&S2 project was undertaken in support of the planning for SR06. It is recommended that Q&S3 projects with a capital maintenance element are similarly reviewed to ensure that costs have been correctly allocated to drivers.

*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. Where projects are not clearly either water or wastewater projects, the cost is allocated on a 50/50 basis to both water and wastewater services.

**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 B3 has been assessed by SW for all of the lines in the table. This is an improved assessment, compared with AR07, reflecting the improved processes for data capture and the allocation of projects to operational areas. This grading is felt to be reasonable.

## 6.6 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.

Comments made on the methodology and confidence grades for Table D7 apply equally 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 90% 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 revised its structure in the report year to from four to eight operational areas. The ABM department structure was revised and simplified to align with this new operational structure.

- 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.

- 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.

- In the report year, Scottish Water has changed its methodology for reporting consent data and compliance at PPP works. In previous years the consent data and compliance was reported against the COPA element of the consent only and excluded consent data and compliance against UWWTD parameters. In the report year,

following the introduction of new CAR Licences, Scottish Water has reported consent and compliance data against the more onerous of the CAR Licence conditions including the UWWTD consent conditions.

### *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:

Costs are initially coded to a matrix of accounts and departments which has been structured to allow costs to be reported against the specific expenditure types and activities required in the Annual Return.

The department structure tree includes a series of staff departments and asset departments. Staff departments reflect the structure of the organisation. Individual staff departments are created at manager or team level, typically including 1 to 20 staff. Asset departments generally relate to individual assets. For the water service individual assets are included for water resource, water distribution and water treatment. For the sewerage service individual assets are included for sewerage collection, sewage treatment works and sludge treatment centres. Some small septic tanks are grouped into single departments based on materiality and ease of management.

Staff costs are initially coded to staff departments. Where possible, staff costs are recharged to asset departments based on timesheet entries against generic work orders related to normal task schedules or specific work orders raised to individual activities. Staff costs recharges include an element of facilities or support costs including vehicle costs, property costs and IT costs charged in from other departments as appropriate.

Where possible direct purchases of goods and services (for example SEPA charges, power costs and chemical purchase) are allocated directly to the relevant asset department by the operational staff responsible.

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. In previous years the data used to make these allocations was based on specific knowledge of costs or activities and the advice of relevant department managers. For the report year it was apparent that the improving ability to code or recharge costs to assets has produced an allocation based on primarily on data with limited reliance on judgement to complete gaps in the information.

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 | 284.204 | £m |
| Total operating cost (wastewater service) Line E2.30 | 246.114 | £m |
| Total operating cost (PFI) Line 3a.24 & E3a.26 | 130.323 | £m |
| Total operating cost | 660.641 | £m |

**From Scottish Water's Annual Report & Accounts 2007/08**

| | | |
|---|---|---|
| Cost of sales (ex Income and expenditure account) | 579.5 | £m |
| Administrative expenses (ex Income and expenditure account) | 100.2 | £m |
| Exceptional items (ex Income and expenditure account) | 0.0 | £m |
| Add intercompany service charges to Business Stream netted out in statutory accounts | 4.1 | £m |
| Deduct FRS 17 charge not included in the regulatory return (page 55 of the annual accounts) | 3.7 | £m |
| Deduct running costs of Business Stream | 19.5 | £m |
| Total operating cost | 660.6 | £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.

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 two of the eight new operational areas with the staff who prepared the allocations. Each area is multifunctional covering water and wastewater and infrastructure and non-infrastructure activities. We also reviewed the allocation of costs with the customer service department.

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.

The asset departments roll up to ABM departments which reflect the operational activity of the company. The mapping of departments had been altered in the report year to reflect the new operational structure.

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.

Scottish Water has continued to implement the electronic time-sheeting systems for its operational staff which was introduced in the previous year. Direct allocation of operational staff time is high, typically running at 80%. Direct allocation of network staff time to assets is typically 50-60%. The company has recognised difficulties in the integration of time recording between activities generated through the customer contact system and activities generated through the works management system and are investigating the introduction of a single timesheet system to address this.

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. This process is facilitated by the structure and size of staff departments. At the level of expenditure types and activities required for the Annual Return, we believe that these allocations are robust.

Work on the allocations was well support centrally by with finance department staff working in the operational areas providing a common link. Individual drill downs are taken into the ledgers to check and review the initial coding of individual expenditure and reallocations made as appropriate. Accruals are made at year end for goods received but not invoiced or paid. Accruals are made at year start and year end for stock (say chemicals). During our audits we were able to obtain the detailed ledger entries for the year for individual assets and reconcile these against the asset accounts. Inspection of the item descriptions indicated that the initial cost allocation was reasonable and that the accounts had been actively checked and reviewed. In one instance we noted the allocation of chemical costs to a treatment works

asset department which should have been coded to the associated sludge treatment centre asset department.

A number of key expenditure types are managed centrally and costs journalled out to individual departments. These include SEPA charges and power costs. In each case, monthly accruals are made based on historic run rate with actuals posted as they arise. The process allows for a robust allocation of these costs.

In the report year Scottish Water has worked to ensure that electricity meters have been read to remove a reliance on estimated readings which have accumulated at a number of smaller works over the year.

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. In the past, the company has relied on allocations outside ABM to allocate sludge transport costs. In the report year the company restructured its accounting systems to allow sludge transport costs to be allocated to individual assets.

The activity drivers used to allocate central costs were based on appropriate data sets for which clear audit trails exist. .

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 | 118.7 | 119.6 |
| PFI | 127.5 | 130.3 |
| Non-regulated activities | 27.3 | 27.3 |
| Scottish Water Business Stream | 2.6 | 2.3 |

| | General Ledger | ABM Output |
|---|---|---|
| Provision of services to Scottish Water Solutions | 2.7 | 2.3 |

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. 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.

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 that some of the allocation of sludge treatment costs and water distribution pumping costs off water treatment works appear not be reviewed to ensure that they are up to date and audit trails maintained. We recommend that these allocations are reviewed and updated if necessary for future returns.

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 £92.2 million. This is a small increase from last year's figure of £88 million.

Scottish Water reports that its infrastructure depreciation charge is not set the same way as in England and Wales but is taken from the final determination. The final determination figure results in an IDC of £88M over the period 2006/7 to 2009/10 (2005/6 prices) and in the final determination WIC assumed that this year's IDC would be £88M, rising with inflation. Accordingly Scottish Water has set a figure of £92M for the reporting year.

In 2006 Scottish Water reported 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 | 2007/8 |
|---|---|---|---|---|---|
| Water main bursts | 8466 | 10102 | 8713 | 7822 | 7975 |
| Sewer collapses | 2399 | 3740 | 2468 | 2754 | 1978 |

This does not show any particular trend of deterioration based on the average spend of £120 million pa in today's prices.

In tables G1 and G2 Scottish Water is forecasting its future IME. This indicates a spend of £103.93 million this year and £133.32M next year, at variance with the proposed £92 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. We understand that Scottish Water is requesting a significant increase in spend on its water infrastructure assets in its SR10 submission.

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 increased from £282.8 million in 2006/07 to £288.2 million in 2007-08, an increase of 1.9%.
- 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.

In its commentary, Scottish Water report an average headcount employed during the year of 3557. The total number of employees reported in Table E11 is 2355, up from 2315 in 2007-08 (1.7%). These figures exclude employees associated with capital works, third party services and PFI to give consistency with the costs reported in Tables E1 and E2.

Scottish Water has noted the impact of additional leakage work in addition to inflationary and other pressures.

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 to reflect the full year impact of new power tariffs following the end of a fixed price contract with Scottish Power.

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 a substantial increase in hired and contracted services. The company has ascribed part of the increase to improved job capture on sewerage network activity.

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 partly to increases in chemical prices and operational costs for new works. The company also notes the impact of material costs due to increase leakage work.

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 £1.1 million increase in SEPA costs mainly attributed to the introduction of CAR licence charges for water abstraction.

Other direct costs

The reduction in other direct costs is mainly due to a reduction in insurance claim 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, the company has reallocated internal regulation costs from general and support costs to other business activities..

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, mainly due to the full year impact of business retail activity transferring to 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.

There has been a shift in the mix of samples and tests from OPEX to CAPEX as new works are commissioned. The increase also reflects increased testing prior to the design phase of works and the lead survey programme.

Other business activities

Other business activities include interaction with regulatory bodies including reporting and liaison.

The increase is costs in the report year relates to:

- Transfer of internal regulation costs from general and support expenditure in previous years.
- An increase in Scottish Water's contribution to the establishment 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.

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 £4.7 million in doubtful debt. This is explained by a further release of household bad debt provisions at a higher level than the previous year.

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 any 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 overall increase in third party services – opex of 0.547 million in the year is less than inflation. The company has described changes in cost in its commentary and highlight the revised treatment of non-domestic septic tank emptying from non-regulated business to core 3rd party services.

Planned and reactive maintenance (included in opex)

Planned and reactive maintenance costs included in opex have not moved materially in the report year. .

Infrastructure Depreciation Charge

There has been a reduction in infrastructure maintenance charge from £88 million in 2006-07 to £90 million in 2007-08. We have commented on the movement in Section 7.1.5. .

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 the increase in non-infrastructure depreciation in the water service due to new assets being commissioned.

**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 83% 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 has changed its methodology for reporting consent data and compliance at PPP works. In previous years the consent data and compliance was reported against the COPA element of the consent only and excluded consent data and compliance against UWWTD parameters. In the report year, following the introduction of new CAR Licences, Scottish Water has reported consent and compliance data against the more onerous of the CAR Licence conditions including the UWWTD consent conditions. Partly as a result less than 100% compliance was reported for 7 works compared with 4 in the previous year.

Peterhead, Whitburn, Dalmuir, Meadowhead and Stevenson are failing works (to 31 March 2008). Whitburn, Dalmuir and Meadowhead were also 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. During the report year we confirmed the scope of works for Seafield against works layout drawings.

*Sewage Treatment – Effluent Consent Standard*

Through out the year regulators have continued to transfer consents to CAR licences. We have used the term consent throughout our commentary.

In the previous report year Scottish Water adopted a policy of reporting consent parameters excluding the UWWTD consent parameters. In the report year Scottish Water has adopted a policy of reporting consent parameters including the numeric consent values under the UWWTD. As a result there have been significant changes in the year and some coastal discharges which, by excluding UWWTD consent conditions last year, reported no consent conditions last year now reporting the UWWTD consent limits.

This is a continuation of a sequence of reversals of policy by Scottish Water. 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.

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 against the more onerous numeric conditions in the consent including the numeric UWWTD parameters. Compliance has been assessed over the calendar year using the regulatory samples.

Peterhead, Whitburn, Dalmuir, Meadowhead and Stevenson are failing works (to 31 March 2008). Whitburn, Dalmuir and Meadowhead were also failing works in the previous report year.

In the report year the failure of a pumping station included in the PPP concession for Seafield which transfers flows to the treatment works failed. This resulted in a widely publicised spill of raw sewage and storm water to the Firth of Forth through the emergency overflow from the pumping station. While the failure affected transfer of flow to the works, there were no reported failures against the sanitary consent parameters at the works. Therefore reported performance for Seafield in Table E3 is 100% of the 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 previous 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.

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.

The sludge quantity estimate for Daldowie is based on reported quantities for April to March pending reconciliation and audit of the final contract figures for the year. During audits for the SR10 submission we noted that final quantities for the previous three years have been marginally less than those reported in the Annual Returns (on average 1.5%).

**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: 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. The report includes UWWTD consent parameters which were excluded from the previous year's return. As a result there have been significant changes in reported consent parameters, typically the inclusion of a 25 mg/l BOD standard and 125 mg/l COD standard which are the standard numeric standards for secondary treatment in the UWWTD.

Line 15: In the section on methodology above we noted the report of 100% compliance at Seafield, not withstanding the discharge of screened sewage and storm water from the emergency overflow at an associated pumping station during the report year.

Lines 15 to 21: Scottish Water has reported treatment works categories in Lines 15 to 21. 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 2006/07 Scottish Water undertook a review to provide a consistent report and a robust audit trail for the data

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 1% from the previous year, well within the margin of estimating error. The reduction in sludge quantity treated seen in 2006-07 has been sustained 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. The Scottish Water costs included in Table E3a have been excluded from Tables E1 and E2.

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.

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 £0.3 million incurred by Scottish Water has been included in Table E3.

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 the report year.

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 | 0.507 |
| SEPA charges paid direct | 0.783 |
| Other costs incurred by Scottish Water including cost of Stonehaven development, and professional services. | 1.752 |
| Sludge tankering from Scottish Water works to PPP works | 2.356 |
| Terminal PS operated by Scottish Water pumping to PPP treatment works | 0.332 |
| Other general and support costs associated with the above allocated through the ABM process | 0.100 |
| Total (reconciles to E3a line 24) | 5.830 |

*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 | 121.799 |
| Business rates paid direct by Scottish Water not captured in the "total Scottish Water costs" above | 2.694 |
| Total (reconciles to Table E3a.26) | 124.493 |

The combined total Scottish Water cost (Line A3a.24) and Annual charge (A3a.26) totals £130.323 million which reconciles Note.3 to the financial statement included in Scottish Water's published Annual Report & Accounts 2007-08.

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. Changes to the asset inventory can be tracked.
- For AR 08 a change has been implemented in the counting of numbers of direct and indirect sources. Ellipse is not capable of distinguishing indirect sources, so that an impounding reservoir that feeds another impounding reservoir will not be counted. Consequently separate spreadsheets of such data have to be maintained.
- Operating costs have been allocated through the ABM process described in Section E Summary. The reported costs reconcile to the resource and treatment costs reported in Table E1.
- The Company has made substantial improvements to the data available for the average pumping head calculation.

### 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.

Ellipse is the basic source of data on numbers, size, type and operational area. Scottish Water is able to identify the individual changes made in the year.

However, because Ellipse cannot distinguish indirect sources, data from 2007 has been used updated manually for 2008. Whilst this is probably reliable for one year, the method may prove increasingly erroneous until 2011 after Ellipse has been reformed in 2010.

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 08 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 now reports against 8 areas. The total volume of distribution input produced is consistent with the distribution input reported in Table A2.

Line 13: The same methodology has been used this year as used last year. Scottish Water has developed the same spreadsheet from last year, adding the 2007-2008 data. The peak week remains in 2003-2004 and therefore the peak to average ratio has not altered between AR07 and AR08. The areas covered by the Company have been altered and because of this they are not providing the peak demand split by area.

Lines 14 & 15: SW advised that it does not have flow meters on the source of raw water or at the entrance to treatment works for the majority of its sites. It records distribution input as the flows leave the treatment works. To determine the flow required for the average head calculation the Company has assumed a percentage process flow loss through the works. If the source flow volume is known the Company has used it. This leads to a potential, unconfirmed, inaccuracy to this figure.

To improve the accuracy of the data SW has completed a survey over the 07/08 report period to fill gaps in its knowledge on pumping head and flow. It has concentrated its efforts on the highest 85% of the "work done" sites. 139 pumping stations equalled 85% of the work done at the 661 total number of pumping stations (source, treatment and distribution). We were presented with data from this survey exercise and the approach appears reasonable and is improving the knowledge base. The survey data gives the average pumped flows and heads for the report year. We understand the flow will be updated annually but the head will not. This is reasonable in the short term as there will be little change in head loss but may need to be revisiting in the longer term. We examined a number of these assessments and they appeared reasonable.

The source and treatment average pumping head has increased by 23% from the AR07 figure. Scottish Water has given no reason other than improved data for the rise.

For sites with no pressure data available, the pumping head is based on the difference in ground level between the pumping station and the discharge point. SW has assumed there is a system head loss at these sites (friction, bends, etc) of 0, 5 or 10m. This assessment is simply based on short distance, reasonable distance and long distance or height pumped (there is no strict definition of these bands). As this is only

applied to the lower 15% of pumping stations this is a reasonable approach prior to obtaining more reliable data.

The data collection and order of preference is as follows:

- If the pumping station has been surveyed then surveyed data is used. This is from both on-site pressure loggers and flow meters, and meters on the supporting networks.

- If pressure is not available then the difference in ground level determined from GIS is used with an assumption of the system head losses.

- If level survey data is not available then the kW data included in the Ellipse database is used.

- Power (in kWh) was used for Treated Water Pumps where no other data was available. Using data for sites that had flow, lift and power a relationship was determined between Power and flow time lift. This relationship was used for the pumps where only power was available. As this relationship was based on only pumping stations with all data, the power use of pump sets is accounted for in the relationship and no assumed power use percentage was used. SW assumes that 100% of the power is used for the pumps at a pumping station and 60% at a treatment works.

- If the kW data is not included in the Ellipse database then the pumping station is banded with known pumping stations producing the same flow; so the assumed head is based purely on the known flow. From our audit the latter can be potentially very inaccurate but we understand is not used on many sites and will make little difference to the average.

We audited a number of source, treatment and distribution pumping station data and followed this through the Scottish Water spreadsheet to determine the average pumping head. From the audit we did find a number of anomalies but generally the data collection and processing was reasonable. One problem involved the average pumped flow being from only eight weeks of data and so was not an annual average. When looking at the banding for sites with no survey or kW data we found a pumping station with a very low flow but very high lift. This unusual case will give a much greater work done but due to its small size it did not substantively affect the end result. Where we audited a borehole pump we found the head and flow data is provided directly by the Water Framework Directive team. For AR08 we did not audit the boreholes in further detail. The borehole pumps contribute significantly to the source average pumping head and therefore it would be advisable to audit this area in AR09.

Lines 15 to 19: Costs have been allocated to assets using the ABM process described in Section E Overview. 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: Comprises operational WTW that provided water into supply at any time during the report year. Table H2 gives the situation at 31st March 2008. SW reports a reduction of 6 WTW in the report year.

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.

**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 C3 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.

Line 13 The confidence grade has increased from C4 to C3 from the AR07. While the 2007-2008 data collection may have improved the resulting peak demand remains from the 2004-2005 historic data which has not been improved. We would therefore advise the confidence grade remains at C4.

Line 14 SW has made marked improvements to the quality of its data for head and flow at each pumping station. We think that the increase in accuracy from 4 to 3 is reasonable and that the reliability could potentially be a B. Unfortunately the average head is based largely on the distribution input so is controlled by this denominator so we agree with the C3 rating.

## 7.6 Table E6: Water Explanatory Factors – Distribution

### Commentary by REPORTER

### Introduction

*Key points*

- The data reported for line E6.1 is not consistent with the reporting requirement to repeat line A2.1.
- 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.
- Operating costs have been allocated through the ABM process described in Section E1 overview.

### Methodology

The methodology is outlined under "Comments by Line" below.

### Comments by Line

Line 0: For AR08, Scottish Water has defined 8 regional operational areas, based on the 32 regional council boundaries where previously the return used 4 areas which were geographically combined from operational areas with consequential splitting of council areas. Three unitary authorities cover more than one regional operational area.

Line 1: The average resident connected population is the winter population distributed across the regional operational areas. Connected population was derived from figures from for each unitary authority area reported in WIC4. Where unitary authorities cross Scottish Water operational boundaries connected population was distributed using OS address points to link to the regional operational areas.

Line E6.1 (4,982,716) is inconsistent both with line A2.1 (4,978,554), the WICS reporting definition and the number derived by SW of the total annual average resident water population as described during the audit of *[Domestic lines A2.3 + A2.4 + population not in domestic properties (87,196)]* of 4,978,627. Inconsistencies between population returns and numbers used by the water balance team have been commented on in Section A line A2.12, the numbers for the E tables being calculated by the Water Balance Team.

Line 2: The reported total connected properties equals line A1.10, as defined. The methodology for calculating line A1.10 is described in Section A commentary.

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. Measured supply data is specific to each regional 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. The methodology for calculating line A1.10 is described in Section A commentary.

Line 5: The reported area of each operational area has been calculated using the corporate GIS database and a query tool based on regional operational area polygons. The polygons used to define the operational boundaries have been refined for this return resulting in a reduction in total area of 215 $km^2$ to 79761 $km^2$ since AR07.

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

For AR08 there were 344 regulatory water supply zones not exceeding 100,000 populations at the end of the calendar year 2007. The number of zones in calendar year 2007 was 354; the reduction has resulted from rationalisation of water quality regulation zones.

Lines 7 – 11 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.

Lines 12–15, 17-18 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 is consistent with the length of potable water main in D5.8 and H3.4

Systems for updating the data for development, renovation and new construction were examined in previous years. 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.

Line 25: As for water resources and treatment PS Scottish Water has completed a substantial survey exercise to improve the accuracy of the average pumping head. The survey was carried out during the 07/08 report period and is the principle reason for the almost 18% decrease in reported head. The method used is as described in Table E4.

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.

In order to infill the missing data SW has compared kW data with known data for properties served on billed energy use. Two cases have been excluded as a result. Pumping capacity is taken as design capacity recorded on Ellipse, except where operational data shows greater average flows. Where this is the case these are substituted. Therefore the gap filling will be partly based on average flows (rather than total installed capacity), but underestimation is unlikely to be significant.

Line 25: The methodology used to calculate average pumping head is described under Table E4.

Lines 26 to 29: Data for numbers, capacities and operational areas for service reservoirs and water towers 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 capacities by assuming that the spread of capacities among unknown sites is the same as the spread among known sites for that operational area. Asset numbers were affected in 2007-08 by reclassifying sites in accordance with DWQR usage so that sites with two tanks are now recorded as a single entity. Investment has brought 15 new service reservoirs into use and eight were recomissioned.

**Comments by Confidence Grade**

Lines 1 & 2: The confidence grades for these line items mirror the grades given for Table A line items. Both sets of table returns were derived from the same data sets and using the same methodology. Subject to the comments on individual line grades in Table A, we consider the confidence grades reported by Scottish Water to be reasonable

Line 25 SW has made marked improvements to the quality of its data for head and flow at each pumping station. We think the increase in accuracy from 4 to 3 is reasonable and that the reliability could potentially be a B. Unfortunately the average head is based largely on the distribution input so is controlled by this denominator so we agree with the C3 rating.

Lines 23 to 24: For these lines Scottish Water has improved the confidence grade from C4 to C3. Given the data improvement exercise that Scottish Water has been undertaking we believe that this is reasonable.

We consider the other 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.

### Methodology

The methodology is outlined under "Comments by Line" below.

### Comments by Line

Line 0: For AR08, Scottish Water has defined 8 regional operational areas, based on the 32 regional council boundaries where previously the return used 4 areas which were geographically combined from operational areas with consequential splitting of council areas. Three unitary authorities cover more than one regional operational area.

Line 1: We believe that the average resident connected population is the household population connected to the wastewater service reported in Line A2.8 distributed across the operational areas. However, for this return, line A2.8 is 4,708,678 which is 83,422 less than the number reported in this line of 4,792,100. The difference represents the population not in domestic properties (transient population and prison population = 84,294 in commentary.

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 difference between the wastewater winter and summer population (lines A2.6 and A2.7) is 261,942. The annual average figure reported in this line (98,100) is not consistent with the figures reported in Table A2.

SW notes that the figure has decreased by 14% as it has made no adjustment to correspond with total bed space nights figure supplied by visit Scotland.

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. For dry weather flow, flow survey recorded data from 38 works is now used in this assessment, as lat year.

*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 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. SW intend to extend the sample next year to approximately 2000.

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 a small 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 resulted in an average of 0.620$m^3$/h/d, as last year.

The estimate of dry-weather flow used in the assessment appears high. It is closer to a typical England and Wales 3 DWF than a dry-weather flow and may indicate that significant quantities of storm water are included in the dry-weather flow estimate. Audit interviews revealed that sewerage models can show high background flows, particularly in urban areas where it was once common practice to allow ground water sources to discharge to sewers.

*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 is the same as in 2007 (38 DAPs). Scottish Water intends to include all known sewerage models (about 200) in the data for 2009.

In 2007, the storm flow assessment was based on models of the main sewerage system draining foul and combined wastewater to treatment works only. This year the assessment is based on the whole sewered area.

SW reports that a review of boundaries on the GIS system has increased storm flows.

*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.

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. We believe that this figure should match the total figure in table A1 line 21 applied across each operational area but we note an inconsistency in the figures.

Line 5: The reported area of the sewer district of each sub-area is the same as that reported for water regional operational areas; line A2.5. This is consistent with the approach adopted for AR07. 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.

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 2007-08 was a wetter year than 2006-07.

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 was used to calculate different average lengths of lateral sewer for different types of property.

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 AR08. In addition any new sewers in AR07 or AR08 are 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 the 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 AR07, 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. Any reports without location codes (39 no) have been spread pro-rata to the four areas. This figure does not match that in Table B8 as it includes third parties which are excluded from the B table.

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.

In 2007-08 SW surveyed 71 targeted sites (126 pumps) to examine pumping efficiency. Data from this survey has been used to infill missing Ellipse data for these lines. Measured figures were used so that there may be small differences in comparison with previous years, and it is not clear exactly how measured average and peak capacities have been allowed for. Although the numbers of PS and kW capacity have risen, the calculated flow capacity and pumping head figures have fallen.

The asset data is consistent with the asset inventory reporting operational assets only. Pumping stations operated under PFI concessions have been excluded.

Line 17: Scottish Water originally proposed a methodology based on AR07 pumped flow (from drop tests) and heads calculated in a variety of ways. The denominator was based on total flows estimated from water consumed. The change in the denominator without changing the pumped flow reduced the average pumping head by approximately 7% compared with last year.

During our audit Scottish Water accepted that the figure submitted for audit could not be relied upon and agreed to re-consider its calculation.

We note that the final submitted figures have been revised from the audit figures but due to time constraints without us being aware of the change.

We believe that the final figures are based on the power used by each site (the power usage data is available for a large number of sites) but have not audited this figure.

Lines 18 to 21: SW have used the same split ratios as last year, which were said to be based on Ellipse data. However, when Ellipse was accessed during the 2008 audit no direct records of combined/foul/surface water categories were visible.

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.

Scottish Water is reporting overflows in the same way as in 2007. 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 subject to the following comments.

Lines 1 & 2: The confidence grades for these line items mirror the grades given for Table A line items. Both sets of table returns were derived from the same data sites and using the same methodology. Subject to the comments on individual line grades in Table A, we consider the confidence grades reported by Scottish Water to be reasonable

Line 5: We consider the confidence grades reported by Scottish Water to be reasonable

Line 12: Confidence grade has moved from B3 to B2 on the basis of infrastructure surveys carried out. This change is accepted.

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.

Line 14: The confidence grade has moved from a B3 to an A2. SW reports that it has made the change on the basis of better reporting. We accept that SW has worked hard to improve its reporting and on this basis accept the

revised confidence grade. However, we note an inconsistency in this line with table B8.

Line 17 The Company has applied the same confidence grade of C4 as last year. As mentioned above, following our audit the Company has revised its figures but due to time constraints did not re-submit them for audit. We are therefore unable to comment on the confidence grade. .

Lines 22 & 23: The confidence grade has moved from B3 to A3, although SW states that it was an A3 last year. We see no reason why the information on CSOs should be any better than that for sewage treatment works and suggest that it stays at B3..

## 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.

### Comments on Methodology

Scottish Water has compiled a spreadsheet derived from Ellipse for Table H5 that holds data on all treated and untreated continuous discharges. It also contains data for operational and non-operational assets and PFI works. 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 a subset of those in Table H5 and are those in operation, excluding 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.

When the load data is attached to the works data from Ellipse, certain anomalies may arise, such as a septic tank in a higher size band. SW has not had the opportunity to investigate this, which may only be a fault of nomenclature. Neither has there been any attempt at data gap-filling. For next year, 2009, a review of the process of allocating and verifying numbers of septic tanks in the higher size bands (2 and above) may be advisable.

The reported loads are consistent with Table A2.

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.
- As in 2007 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 are extracted from a SEPA report supplied to SW by SEPA and covers the fiscal year (change from 2007).

**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.

PPP works are not included in reported data in table E8.

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 21to 30: The compliance report includes performance against the CAR and UWWTD standards included in the consents or licences. Last year performance against UWWTD standards was not included. 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 E Overview. 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. Prior to 2007 general and support expenditure was allocated in proportion to load.

**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. While the total has stayed the same Galashiels STW has been dropped and West Barns STW has been included.
- The data sources are consistent with other sections of the return, including the sewage loads in Section A.

### 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.

There has been one works added in the year, West Barns, as a result of a population increase. Galashiels has been dropped.

Compliance data is taken from published SEPA figures.

SEPA recorded no samples in the year at West Barns and Dalderse. West Barns is anomalous as it is effectively only providing preliminary treatment prior to sea discharge. Dalderse is subject to investment improvement to bring its effluent within licence conditions.

### Comments by Line

| | |
|---|---|
| Line 1 | Reports the population equivalent rounded to the nearest 1000. |
| Lines 2 to 6 | The reported consent parameters are the tightest licence figures and therefore include UWWTD parameters. |
| Line 7: | The reported data is the number of sample failures 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 E Overview. The costs are consistent with the direct costs and functional expenditure reported in Table E2 for sewage treatment.<br><br>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. Prior to 2006/7 general and support expenditure was allocated in proportion to load.

**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 is the total for Scottish Water's treatment works, but is incompatible with the sludge quantities because some sludge is supplied raw to PPP concessions for treatment and disposal.

The sludge quantities reported are the quantities of sludge produced from SW's sludge treatment centres.

Total operating costs for sludge treatment and disposal have been allocated through the ABM process described in Section E1.

Prior to 2007 sludge costs have been distributed between outlets in proportion to sludge quantity. Since 2007 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 £9.2 million in 2006/07 to £10.6 million in 2007/08 (an increase in cash terms of 15%). The estimated sludge quantity has reduced from 21.8 ttds in 2006/07 to 21.5 ttds in 2007/807 (a reduction of 1.4%). The average unit rate for sludge disposal has increased by 17% in addition to last year's increase of 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 is 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 note that the reported figures indicate a very low sludge production per resident population for sludge disposed of through composting. SEPA's restrictions on the composting process are such that final disposal is effectively impossible. SW does manage to dispose of sludge to the composting process, but only for works close to the border.

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 E Overview. The costs are consistent with the direct costs and functional expenditure reported in Table E2 for sludge treatment.

For the report year £2.3 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.

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 the report year, Scottish Water has allocated the estimated total sludge cost between outlets using a combination of direct cost capture on the general ledger supported by 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 is a further improvement on methods used in previous years.

The change in disposal outlets for sludge in the report year is summarised below:

| **Outlet** | **Ttds (rounded)** | | | **%** |
|---|---|---|---|---|
| | **2006-07** | **2007-08** | **Variance** | |
| Farmland Untreated | 0.000 | 0 | 0.000 | |
| Farmland Conventional | 6.667 | 7.3 | +0.63 | +9.4% |
| Farmland Advanced | 9.601 | 11.9 | +6.20 | +6.5% |
| Incineration | 0.000 | 0 | 0.000 | |
| Landfill | 2.106 | 0.6 | -5.51 | -2.6% |
| Composted | 0.255 | 0.2 | -0.06 | 0.2% |
| Land Reclamation | 3.195 | 1.5 | -1.70 | -53.2% |
| Other | 0.000 | 0.000 | 0.000 | |
| Total | 21.824 | 21.5 | -0.3 | -1.4% |

There has been a small reduction in sludge quantity overall of 1.4%, which seems within annual variation. The major movement in sludge disposal outlets has been from land reclamation to farmland advanced. The land reclamation outlet continues to decline following changes to application rules by SEPA, and composting is nearly eliminated.

**Comments by Line**

Lines 1 to 2: 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. The figure is reduced in comparison with 2007 because all sea outfalls were accidentally included last year.

The quantity of sludge is taken from Scottish Water's Gemini tanker movement system 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

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 E1.

The ABM system includes sludge treatment and disposal cost centres linked to assets. This allows a significant proportion of sludge costs to be reported by disposal route. Some transport costs continue to be allocated to disposal route based on estimates from a separate sludge logistics model.

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 exception:

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 B2 confidence grade is appropriate for the total costs allocations. We suggest a B3 confidence grade for the allocation of costs

between outlets to reflect the increased use of direct cost capture and less 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, temporary 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.

- During the report year Scottish Water undertook surveys of its offices, depots and laboratories. The surveys included measuring the areas of the assets and assessing their condition. This has resulted in a significant improvement in the quality of the information in this return.

- We have not audited 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. Temporary and 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 staff member who works for 50% of each month will be recorded as 0.5FTE. Every staff member is assigned to a department.

Allocations to the lines in the table are done as follows:

- ABM outputs are used to assign staff to the core business and non core business and to allocate core staff to operations or capital works.

- Allocations to water and wastewater and lines E11.1 to E11.3 are allocated 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 |

Each month a FTE report is prepared from the payroll system. The 12 reports for the year are averaged to give the results for Table E11.

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; and
- they do not include temporary staff or staff hired through agencies. Scottish Water reports that the latter is small as Scottish Water does not encourage the use of agency staff.

*Properties*

The basic data source for property returns is the spreadsheet maintained by Property Facilities and analysed by the IDR group. 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.

Offices are defined as buildings having more than 100 workstations. The 10 offices include Watermark House which is leased by Scottish Water (and who are liable for its maintenance) although SWS are using a part of 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 (55 properties in use) is consistent with the 55 reported at line H 6.2.

Asset surveys carried out during 2007 re-measured floor areas for 47 properties and so the areas reported in lines 11.6, 11.8, 11.10, 11.12 and 11.14 are now much more accurate than last year.

*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. 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, value, life categorisation, criticality and age.

As for AR 07 differing categorisations are used for IS assets in Tables E and H. In practice the following allocations are made:

- H6.6 Band 1 = E11.18 (Desktop & laptop computers)
- H6.6 Band 2 = E11.19 (Servers)
- H6.6 Band 3 = E11.20 (Mainframes)

**Comments by Line**

Lines 1 to 4: Includes staff who are directly employed by Scottish Water. Excludes staff employed in capital projects, staff employed on PPP work, staff seconded to SWS, non core staff, part time staff and agency staff.

Scottish Water reports that the increase of 102 staff over last year reflects additional staff required to deliver customer service improvements.

Lines 5, 7, 9 & 13: The numbers of offices, depots, laboratories and control centres are double counted, being shown against both the water service and the wastewater service. Last year numbers of laboratories were allocated to each service.

Lines 6,8,10 & 14: Areas have been allocated to water and wastewater services in the same ratio as employee numbers in these services.

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 the PCs have not been double counted, although this is asked for in WICS guidance.

**Comments by Confidence Grade**

Confidence grades are generally consistent between E11 and H6 apart from offices and laboratories which are given a collective confidence grade of B2 in H6 compared to the B3

confidence grade of B3 in E11. Given that floor areas have been measured we see not reason not to use the B2 grade in both tables.

We accept that the definition of a dept and workshop is open to greater interpretation and so accept the B4 grade suggested.

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. We believe that the confidence grades given in Table E11 is likely to be a better representation of the accuracy of the data.

# 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. Delivery of Q&S2 outputs, Q&S3 Ministerial objectives and Q&S3 serviceability measures are reported in Tables G7-9.

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 are subject to critical third party issues

Scottish Water reports delivery of its outputs for years 1 and 2 of Q&S3 and has met the targets in its Delivery Plan subject to minor exceptions. The Company has generally 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. We have also reviewed 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*

- There continue 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.

- The detailed project report in Tables G5 and G6 is the same as that in the capital investment return for 2007-08 Q4. The CIR for Q&S2 no longer includes the adjustment line which was included in AR07. However project expenditure with a value of c£28 million has been re-phased to after 2009/10. This principally reflects expected slippage due to third party factors in Dunoon Sewerage (1243) and Campbelltown Sewerage Infiltration Permanent Solution (8806).

- 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.

- We noted that Scottish Water now employs a risk analyst who develops the risk management autocodes and the information within them, based on formal risk registers. This is a more structured approach than we have seen in previous years and we believe that it is a beneficial development.

- Good progress has been made in developing the Q&S3 programme and bringing projects to CAPEX3 stage. This progress needs to be maintained for the remaining projects to further reduce the degree of uncertainty in the estimated expenditure projections on individual projects and the programme as a whole.

- We reviewed the Q&S3 third 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 third party risks will materialise causing delay and cost escalation to a small number of projects.

- 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 the Company 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.

- Following resolution of the required discharge standards, discharge location and scope of works for improvements to Loch Ryan it is clear that the budget will not be sufficient to cover the estimated costs of the expected scope of works. This project has been deferred to beyond 2009/10, resulting in a small shortfall in the number of UIDs to be improved in the Q&S3 period.

- Scottish Water is projecting an overhang of expenditure from the Q&S3a programme of £73.988m. For the large majority of projects this expenditure consists of minor completion items for projects where construction work will be completed before the end of the current investment period. A proportion of this cost is included in sub-holding programme lines (in particular, the water quality, wastewater quality and UID programmes) and reflects management's 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 Tables G5 is G6 is 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 | 173.075 | 64.479 | 35.128 | 26.040 | 28.079 |
| CIR expenditure profile | 173.075 | 64.479 | 35.128 | 26.040 | 28.079 |
| Difference CIR – Table G5 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

In AR07 the CIR for the completion of Q&S2 contained an adjustment line reflecting the opinion of Scottish Water management on overall future progress of the completion programme. The adjustment reflected an overview of programme risks which might not be accounted for in individual project assessments. This adjustment item has been removed from the programme and instead project expenditure with a value of c£28 million has been re-

phased to after 2009/10. This adjustment principally reflects expected slippage due to third party factors in two high-profile sewerage projects.

*Comparison of Q&S3 Programme (Table G6) with the CIR*

| | 2006-07 | 2007-08 | 2008-09 | 2009-10 | Post 09/10 |
|---|---|---|---|---|---|
| Table G6 expenditure profile | 240.211 | 560.787 | 635.021 | 607.114 | 73.988 |
| CIR expenditure profile | 240.211 | 560.787 | 635.021 | 607.114 | 73.988 |
| 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. However the programme contains a risk holding line with expenditure of £55.200m (net) for AR08, with a negative figure of -£31.719m in 2008/9, to allow for slippage in projects in that year which has not been identified on a project-specific basis. It is expected that the size of this reserve will reduce in future years.

## 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.

Tables G1 and G2 summarise 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. For Q&SII projects the practice was to allocate costs equally to each project driver at CAPEX1 stage, 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 however been revisited during the report year for completed Q&SII capital maintenance projects. 42% of Q&S2 projects (as reported in Table G5) have more than one driver and so have proportional allocation applied.

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. 29% of Q&S3 projects (as reported in Table G6) have more than one driver and so have proportional allocation applied.

A small sample of projects was reviewed to illustrate the application of the rules and gave an indication that costs had been correctly allocated to drivers.

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. Total Opex was reconciled with the Annual Accounts for water and wastewater services.

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.

Grants and capital contributions reported in Tables G1 and G2 are summed from the individual project lines in Tables G5 and G6 and relate mainly to the infrastructure charge. Figures reported are the actual receipts reported by the Finance department. Scottish Water

report no grants and contributions against future years in either table as there is no guarantee that these will actually materialise.

Scottish Water makes an infrastructure charge for each property newly connected to the water supply and sewerage systems, as in England and Wales. Unlike E & W, however, SW pays developers a "reasonable cost contribution" of providing infrastructure for properties [The Provision of Water and Sewerage Services (Reasonable Cost) (Scotland) Regulations 2006 (WSRC2006)]. Full details of arrangements for developers are in SW's publication "Guide for Obtaining New Water and Waste Water Services".

Full details of how a developer may obtain new services are set out in SW's Guide for Obtaining New Water and Waste Water Services. The arrangements are made by the developer with the Planning and Development Services Team at the Balmore Road office. Each case is dealt with individually, but to a standard format. The developer's agreement includes both infrastructure and reasonable cost contribution charges and payments, and is clearly and carefully set out to developers. We understand that the system is generally understood by most developers and that queries and complaints are few. The infrastructure charges are set each year and published in SW's Scheme of Charges. They are not calculated by the Planning and Development Services Team.

Reasonable cost contributions are capped to a formula representing SW's income from the properties in the development. SW publishes the maximum contribution annually on its website for domestic properties, and publishes the formula used for non-domestic properties in the Guide. The costs used to calculate the reasonable cost contribution are derived from SW's framework contracts. Currently SW is reviewing the rates based on the latest frameworks, and the rates used up to now are given to the developers when the contribution offer is made. The rates are inclusive of all on-costs except for a standard 8% charge for administration, design, checking and inspection.

**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 E.1. SW note that the difference is within the confidence grade.

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.

**Comments by Confidence Grade**

Scottish Water generally reports a confidence grade of B2 for capital expenditure estimates for the report year and for future years. This is an increase in confidence grade compared with AR07. We believe that a grade of B2 is reasonable for the report year, but suggest that a confidence grade of B3 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 summarise the investment reported at project level of Table G5 by quality driver. They are produced by summing projects in Table G5 and are in turn summarised to produce the Q&S2 information in Tables G1 and G2.

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 report year expenditure reconciles to the detailed project data in Table G5.

We have commented on the current methodology for allocation of CAPEX by output measures under Table G5. The robustness of allocations for Q&S2 projects has improved following a review and a greater proportion of allocations are now based on an analysis of project scope and expenditure. Significant numbers of projects have however not been reviewed. It is recommended that this review should be completed for all projects except those having a single capital maintenance driver.

### Comments by line

None

### Comments by confidence grade

The Company generally reports a B2 confidence grade for expenditure by individual quality drivers, an improvement in confidence grade from AR07. The allocation of equal allocation of expenditure between drivers on individual projects has been revisited on many Q&S2 projects, but by no means all. We therefore suggest a B3 confidence grade overall.

## 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 report year expenditure reconciles to the detailed project data in Table G6.

We have commented on the allocation of CAPEX by output measures under Table G6. The allocation of costs to drivers is more robust for Q&S3 projects than for many Q&S2 projects, being based on an analysis of project scope and expenditure for the majority of projects and being subject to revisiting at CAPEX stages except for projects under £0.1m in cost.

Base Opex in Table G4a reconciles with Table G1. Base Opex in Table G4b reconciles with Table G2.

### Comments by line

Line 1 — We have not been able to reconcile base operating expenditure with the total operating expenditure reported in Tables E1 and E2. SW notes that the difference is within the confidence grade.

### Comments by confidence grade

The Company generally reports a B3 confidence grade for expenditure by individual quality drivers. This is supported. Given the improved but still incomplete extent of detailed development of the programme at this stage, we suggest a B4 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 we concluded that there continues to be significant uncertainty regarding the cost and programme completion of the reducing number of projects carried over from Q&S2.
- In the 2007-08 Q4 CIR and Table G5 Scottish Water reflects some of this uncertainty with an adjustment which moves a proportion of projected Q&S2 expenditure back to subsequent years. We have been able to reconcile the total expenditure and the phasing of expenditure between Table G5 and Tables G1 to G3.
- As in AR07, Table G5 again 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 in 2006-07 and 2007-8 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. Funding is not available for these outputs and the work has been deferred to beyond the end of the Q&S3 period.
- Scottish Water reports a much reduced future expenditure of £0.310m against programme risk for the water and wastewater programmes. This figure compares with a figure of £10.76 million reported in AR07. 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. No allowance is made for grants and contributions in future years in the G1 and G2 summary tables as there is no guarantee that these will actually materialise.

### Methodology

Table G5 reports expenditure on the completion of the Q&S2 programme. The structure of the table follows 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, are taken from the Scottish Water capital approvals system.

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 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 project manager's current view of the project was materially different from that reported in CIMS and captured at year-end.

**Comparisons with Other Submissions**

*Table G5 to Tables G1 and G2*

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** | **Post 2009-10** |
|---|---|---|---|---|---|
| Table G1 (Q&S2) | 75.590 | 22.091 | 7.490 | 1.848 | 0.489 |
| Table G2 (Q&S2) | 97.485 | 42.390 | 27.637 | 24.192 | 27.590 |
| Table G1 & G2 (Q&S2) | 173.075 | 64.481 | 35.128 | 26.040 | 28.079 |
| Table G5 | 173.075 | 64.479 | 35.128 | 26.040 | 28.079 |
| Difference (G5-G1&G2) | 0.000 | -0.002 | 0.000 | 0.000 | 0.000 |

The slight difference in 2007/8 is due to rounding error.

*Table G5 to CIR Q4*

*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 | 173.075 | 64.479 | 35.128 | 26.040 | 28.079 |
| CIR expenditure profile | 173.075 | 64.479 | 35.128 | 26.040 | 28.079 |
| Difference CIR – Table G5 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

In AR07 the CIR for the completion of Q&S2 contained an adjustment line reflecting the opinion of Scottish Water management on overall future progress of the completion programme. The adjustment reflected an overview of programme risks which might not be accounted for in individual project assessments. This adjustment item has been removed from the programme and instead project expenditure with a value of c£28 million has been re-phased to after 2009/10. This adjustment principally reflects expected slippage due to third party factors in Dunoon Sewerage (1243) and Campbelltown Sewerage Infiltration Permanent Solution (8806).

*Comparison of Table G5 with WIC 18*

We have also compared the on-going projects on Table G5 with a copy of WIC 18 programme provided by Scottish Water. All of the WIC18 projects were found in G5, with a match of costs at pre-efficiency prices, after allowing for 19 projects which were disaggregated from original WIC18 projects in the maintenance programme, including disagregation of work on DSEAR compliance.

**Project-specific Audits - Q&S2 Projects**

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. Project drivers have generally been correctly allocated.

However it was noted that:

- Where projects are being run by Scottish Water Solutions, the project manager does not always have a clear picture of total project cost, as opposed to construction cost and SWS cost.
- In some cases the capital programme and Table G5 have not been updated with the Engineer's latest estimate of outturn cost, even where this has changed significantly.
- Opex reductions due to works abandonments do not always appear to have been taken into account in assessing Opex impact.

The findings of project-specific audits are summarised below.

Drymen WWTW Extension (6) (with Q&S3 Follow-on Project Drymen STW Extension Completion (30222))

The project is to reduce phosphorus in the discharge to Loch Lomond and to add storm tank capacity, filter ventilation and improved filter dosing to deal with overloading to ensure COPA compliance. The drivers of WQ1/1 and WQ3/2 are correctly allocated. Phosphate treatment is by ferric sulphate dosing, with caustic soda for pH correction. CAPEX 1 was approved in June 2004 at a cost of £173,000, with an estimated completion date of December 2005 to coincide with the regulatory deadline for phosphorus. Following extensive data collection to size and verify the phosphorus treatment process, a joint CAPEX2/3 submission was approved in July 2005, with completion then expected by February 2006.

The project has been beset by difficulties, arising from the tight awkward site and poor ground conditions, including the damage beyond economic repair of an existing storm tank by settlement. These resulted in delays and additional costs. The works were completed in July 2007 and CAPEX 5 was approved in October 2007. The engineer's estimate of outturn cost is £1.999m. Tables G5 and G6 show a combined total cost of £2.066m. Compliance with the phosphorus standard has been maintained throughout by the use of temporary dosing equipment. Although an existing storm tank was replaced with a new asset as a result of damage, this is not considered by Scottish Water to represent a Capital Maintenance synergy. As a result of the project operating expenditure has increased from £33,000 to £63,000 p.a. This has not been updated on Tables G5 and G6, which show a combined opex increase total of £33000.

Bowmore Sewage Treatment Facilities (1233)

This project is to eliminate the discharge of raw sewage to the sea. The project drivers of EC1/4 (UWWTD Coastal) and WQ3/1 (Protection of Risk) appear to have been correctly allocated. A consented trade effluent discharge from a distillery is also discharged through the same outfall. The works consist of sewers, a pumping station, treatment in a facultive lagoon and the construction of a new long sea outfall. The lagoon also provides the strategic solution for sludge on the island of Islay. The original proposal was to collect and treat both effluents through the proposed system. However surveys have shown that the distillery effluent is very high in copper and cannot be discharged to the lagoon. To maintain progress the public element of the project is being progressed and design is now complete. The estimated cost of this element is £4.374m and the forecast completion date is November 2009. This compares with the original legislative deadline of 31.12.05. SEPA have been kept informed of progress. Table G5 shows a total cost of £4.904m.

Design is proceeding on the treatment of the distillery element of treatment, including copper reduction. When this is complete the distillery may either instruct SWS to go ahead with construction or engage their own contractor. The distillery effluent will share the same outfall but separate sampling points will be provided. There is a risk of delay to this part of

the work, which is at no cost to Scottish Water, due to the need to agree the proposals and consent with SEPA. Until satisfactory treatment and discharge are secured, SW remains liable for the effluent as it is a licensed trade discharge.

Dunoon Sewerage (1243)

This Q&S2 project is to provide secondary treatment and eliminate 20 discharges of raw sewage to the sea, catering in addition for increased population up to a population equivalent of 14,500, by providing gravity sewers, pumping stations, rising mains and a waste water treatment works. The project paperwork shows project drivers of EC14 (UWWTD – Coastal) and WQ3 (Protection of Risk), which appear to be correct.. The project has increased in scope since CAPEX1 stage approval in February 2004, when only primary treatment was envisaged and the population equivalent for treatment was under 10000. The most recent formal approval was CAPEX3 in February 2005, which covered secondary treatment and a population equivalent of 10685. The population which is to be catered for remains to be confirmed. The latest engineers' estimate of cost is £29.9m, with a start on site in November 2008 and beneficial use in February 2011. Table G5 shows a total cost of £24.820m. This programme allows for known risks to progress, which include the need to CPO land for the WWTW site, outstanding planning permissions for 2 of the 7 pumping stations, and the need for final approval of the consent by SEPA, who have been involved in development of the dispersion model. It is likely that overhang of approximately £12m into the SR10 will result from this project, compared with the figure of £2.149m which is included in the quarter 3 CIR, used as the basis for planning the draft SR10 programme.

Beith CSOs Upgrading (2191)

The project is to upgrade two existing CSOs, which will remain as emergency overflows, and lead flows downstream in a new sewer to a point in the network with adequate capacity, providing a new CSO which will only operate rarely. The overflow proposals have been agreed by SEPA. The drivers of EC1/1 (Inland UID – Debris) and WQ2/2 (Inland UID – Fungus) appear to have been correctly allocated. The project currently has CAPEX3 approval at a cost of £2.107m. Table G5 shows a total cost of £2.162m. Design is complete and there is good confidence in completion by the programmed date of September 2008.

Lochgilphead Front Green CSO (2399)

This project, which is to improve an unsatisfactory CSO, is being run as a single project with Lochgilphead Peddie Bank CSO (2400). The project will reduce the frequency of spills at both overflows by providing tank and inline sewer storage and installing two mechanically-raked screens. The project driver of EC03/1 – CSO, intermittent has been correctly allocated. The works are progressing on site with completion expected in August 2008. The original regulatory date for completion of this project was 31.12.05, but SEPA have been kept informed of progress. SEPA have yet to approve the consent for the project

but this is not expected to pose a problem. The Engineer's latest estimate of outturn cost is £1.476m. Table G5 shows a total cost of £1.575m.

Mugdock (M1) Rehabilitation (9479)

This project originally consisted of the rehabilitation of 33.7 km of mains by various methods. The output measure code of Wa5 has been correctly allocated. The scope was subsequently reduced by agreement between Scottish Water and Scottish Water Solutions with the removal of 1.5 km of mains facing very serious traffic management issues in Maryhill Road. The project scope was further reduced following a review of programme outputs in March 2006. As required Q&S2 rehabilitation outputs had been delivered at a programme level, a further 9.98 km of mains were removed from the project and transferred to a new Q&S3a project (34549).

The project 9479 work was completed in March 2006, although CAPEX5 was not submitted until February 2008, showing an outturn cost of £1.444m, for 22.6 km of mains rehabilitation. Table G5 shows a total cost of £1.708m.

A new CAPEX1 form was issued for Q&S3a project 34549 at an estimated cost of £0.667m based on unit cost estimates. CAPEX 3 is currently being prepared and the estimated cost is £0.978m, based on actual methods to be used. The forecast completion date is to be confirmed.

Barclye and Palnure WTWs (10121)

This project originally consisted of upgrades to two WTWs to meet standards on THM, colour, iron and aluminium. The output measure codes of DW2 and DW3 have been correctly allocated. The May 2004 CAPEX1 cost was £4.7m. Investigation showed that yields were inadequate and boreholes were proposed to deliver increased resource. However the required borehole yields could not be proved and it was the agreed to connect the system to the Penwhirn WSZ at New Glenluce, at significantly increased cost. The August 2007 CAPEX3 showed an estimated cost of £10.135m. Work is currently proceeding on site with CAPEX5 expected in August 2008 and an estimated outturn cost of £11.556m, based on CAPEX4. Table G5 shows a total cost of £10.780m.

The works are the subject of DWQR Authorised Departures with dates of 30.9.07 for Barclye and 1.4.09 for Palnure. Discussions are continuing with DWQR over the delay in resolving the quality issues for Barclye. A risk register was prepared for the project, showing large risk costs for ground conditions and an early start in advance of the completion of design. These risks have now been mitigated. The project reports no change in Opex. The reduction in Opex as a result of the abandonment of the two works is attached to the abandonment project.

## 8.6 Tables G6 – Q&S3 Project Analysis – Actual and Forecast

### Commentary by REPORTER

### Introduction

*Key Points*

- Table G6 covers the Q&S3a programme. The key investment areas for the report year are ramping up the quality programme, including the UID programme which is heavily dependent on completion of studies, and meeting serviceability outputs.

- In the report year investment has increased significantly. Capital maintenance expenditure continues at a high level, with significantly increased expenditure on quality projects, especially for drinking water. The programme of water resources studies is virtually complete, while the UID study programme is well advanced.

- The programme contains a risk holding line showing £55.2m (net) for AR08, with a negative figure of -£31.719m in 2008/9, to allow for slippage in projects in that year which has not been identified on a project-specific basis, and £86.919m in 2009/10.

- In our report on AR07 we noted that the CAPEX3 target dates in Table G6 showed that a significant proportion of the current year spend needed to go through CAPEX3 in the summer of 2007 to deliver the projected expenditure of 2007-08 and secure on-going progress on the programme. An analysis of stage of approval in Table G6 for AR08 shows that almost 70% of the G6 programme now stands at CAPEX3 approval or beyond. This represents good progress, although this needs to be maintained as a significant number of projects still require rapid progress to the CAPEX3 milestone to ensure that the programme is delivered. Significant elements of the projected expenditure remains in sub-programme holding lines pending development of detailed proposals

- Table G6 has been fully reconciled with Tables G1 and G2, the WIC 18 programme and Table K56 of AR06.

### Methodology

Table G6 reports expenditure on the Q&S3a programme. The structure of the table follows 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 as described for Table G5 above.

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. From our individual project audits and an analysis of Table G6 we noted that significant progress has been made during the past year on bringing

projects to CAPEX3 approval. Almost 70% of projects in Table G6 had reached or passed this stage by the end of the report year. This greatly reduces the potential for significant changes to projects as they are developed and have 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 | Post 2010/09 |
|---|---|---|---|---|---|
| Table G1 (Q&S3) | 126.485 | 328.958 | 370.535 | 346.484 | 33.892 |
| Table G2 (Q&S3) | 113.623 | 231.829 | 264.484 | 260.630 | 40.095 |
| Table G1 & G2 (Q&S3) | 240.211 | 560.787 | 635.021 | 607.114 | 73.987 |
| Table G6 | 240.211 | 560.787 | 635.021 | 607.114 | 73.988 |
| Difference (G6-G1&G3) | 0.000 | 0.000 | 0.000 | 0.000 | -0.001 |

All expenditure on Table G6 is carried forward to Tables G1 and G2 for the relevant years. Tables G1 and G2 do not include the reported expenditure on the Q&S3 programme prior to 2006-07.

*Comparison of Q&S3 Programme (Table G6) with the CIR*

| | 2006-07 | 2007-08 | 2008-09 | 2009-10 | Post 09/10 |
|---|---|---|---|---|---|
| Table G6 expenditure profile | 240.211 | 560.787 | 635.021 | 607.114 | 73.988 |
| CIR expenditure profile | 240.211 | 560.787 | 635.021 | 607.114 | 73.988 |
| 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 set 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.

Because of the development of projects described above, reconciliation of Table K56 and Table G6 is not straightforward. However we were able to compare the outputs planned to be delivered by the two programmes. For virtually all output lines the outputs delivered in Table G6 were equal to or greater than those planned to be delivered by the K56 programme. Exceptions are listed below:

*Differences between Table K56 and Table G6*

| Output Code | Description | Units | Table K56 | Table G6 | Comments |
|---|---|---|---|---|---|
| CS2 | Odour Management | Works | 35 | 14 | 21 odour outputs are actually for Q&S3b |
| DW7 | Birds and Habitats Directive | No | 49 | 37 | Outputs transferred between DW7 and WR1 |
| WR1 | WFG – UKTAG Guideline Abstraction Thresholds | No | 29 | 41 | |
| EC01 | UWWTD | PE | 1507949.727 | 1497421.727 | Due to change in assessed population actually to be served by identified projects |
| EC04 | Freshwater for Fish Directive | PE | 344760 | 342311 | |
| EC09 | Dangerous Substances Directive | No | 12 | 6 | Target reduced to 6 with agreement of the Regulator |
| EC12 | IPPC Directive | No | 61 | 1 | No of sites reduced by agreement with SEPA |
| RDC | Remove Development Constraints | PE | 120000 | 0 | Outputs transferred to SG1 and WG1 |
| SG1 | Growth - Sewerage | PE | 0 | 87106 | |
| WG1 | Growth - Water | PE | 0 | 115911 | |

| Output Code | Description | Units | Table K56 | Table G6 | Comments |
|---|---|---|---|---|---|
| SG3 | First Time Wastewater | No | 806 | 630 | Due to change in assessed properties actually to be served by identified projects |
| WR5 | WFD – Water Quality Licences | No | 574 | 521 | 53 sites to be abandoned |

From the above table we have concluded that Tables K56 and G6 have been satisfactorily reconciled on the basis of outputs to be delivered. We have not identified any specific quality projects in Table K56 which have not been retained in Table G6.

*Inflation*

Tables G5 and G6 and the CIR are all at project outturn prices. Up to CAPEX3 stage no better estimate of cost is available and project costs are essentially Business Plan estimates at 2003/4 prices inflated by COPI to the projected mid-point of construction. From CAPEX3 stage onwards estimates are the project manager's estimate of outturn cost, comprising some actual past costs and also future costs, including tendered and framework rates, inflated using projected COPI to the midpoint of construction. 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 for water and wastewater. As a result, 100% allocation to a single 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. In a limited number of cases, such as site inspections with quality implications, a proportional allocation may be made to another output driver such as WR1 (UTAG Guideline Abstraction Thresholds)

Where asset maintenance is carried out as part of a quality project, an allocation to maintenance is made. For AR07 the practice was to base this on the project allocation made in the Business Plan and carried into Table K56. In a limited number of cases a change in the allocation to asset maintenance was made based on current understanding of scope and budget for the project. For other projects, the remaining allocation after asset maintenance was generally divided equally between the relevant quality and other drivers.

From AR08 practice is different, following a guidance note on capital expenditure allocation submitted to WICS for approval by Scottish Water in January 2008. This has not yet been agreed by WICS. All projects will be assessed for the percentages to different capital drivers at CAPEX1 stage. The guidance notes require that the allocation of project costs to drivers is revisited at each CAPEX stage, and this was found in practice to be the case during the audit.

29% of Q&S3 projects (as reported in Table G6) have more than one driver and so have proportional allocation applied. The revisiting of drivers is not required for projects with values below £100000. This is because these small projects often progress directly from CAPEX1 stage to construction.

A small sample of projects was reviewed to illustrate the application of the rules and gave an indication that costs had been correctly allocated to drivers, with costs being allocated to drivers in the proportion of the cost required to meet those drivers.

For 2 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 a project-by-project basis 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.

*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. The line entry is retained in Table G6 but the expenditure profile has been set to zero.

- Auto codes 999994 and 999995 – "Q&S3 risk management fund" which provided a reserve against unforeseen circumstances within the programme. These lines have now been removed from the programme.

A new risk holding line was created - 40020 Q&SIII Risk Management Fund Holding Code - with expenditure of £78m at AR07. This is reduced to £55.200m (net) for AR08, with a negative figure of -£31.719m in 2008/9, to allow for slippage in projects in that year which has not been identified on a project-specific basis, and £86.919m in 2009/10. This risk holding line 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.

We noted that Scottish Water now employs a risk analyst who develops the risk management autocodes and the information within them based on formal risk registers. This is a more structured approach than we have seen in previous years and we believe that it is a beneficial development.

*Q&S3 Overhang*

Scottish Water is projecting an overhang of expenditure from the Q&S3a programme of £73.988. For the large majority of projects this expenditure consists of minor completion items for projects where construction work will be completed before the end of the current investment period. Numbers of projects showing overhang spend are as follows:

| All projects with overhang exceeding: | Number | Total estimated overhang £m |
|---|---|---|
| Zero | 1041 | 73.988 |
| £0.2m | 48 | 59.564 |
| £0.5m | 22 | 48.953 |
| £1m | 9 | 42.521 |

It can be seen that the bulk of overhang cost is concentrated in a small number of projects with significant post 2009/10 expenditures.

Overhang projects include a small number of holding codes. These are essentially reserves of money, due to be allocated to specific projects, at which time the remaining value of the holding code will be correspondingly reduced. Holding code projects with overhang into 2010/11 are as follows:

| Project | Estimated overhang (£m) |
|---|---|
| UID Holding Code (40025) | £23.000 |
| Water Resources Holding Code (40029) | £1.394 |
| Capital Maintenance Wastewater Non-infra | 0 |
| Total | 24.394 |

The UID Holding Code project (40025) was audited and it is clear that holding codes are intended to be allocated entirely to projects for completion within the current investment programme, reducing the holding code to zero before the start of 2010/11. It is therefore recommended that no holding code projects should be included in the estimation of Q&S3 overhang. If projects which are promoted from the holding code themselves, show overhang, this should be estimated on a project-by-project basis.

**Project-specific 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. Project drivers have generally been correctly allocated. On the whole, a better agreement between the Engineer's estimated outturn cost and Table G6 was found for these Q&S3 projects than for Q&S2 projects. However it was noted that:

- Project managers' estimates of project outturn cost and completion were generally found to be realistic and to be accurately reflected in Table G6.
- Where projects are being run by Scottish Water Solutions, the project manager does not always have a clear picture of total project cost, as opposed to construction cost and SWS cost.

- One project: Ballachulish, N Ballachulish and Glencoe WWTP Upgrade (36588), with an Engineer's estimated outturn cost of £5.128m and an Opex impact of £39000 p.a. was not found on Table G6 Scottish Water confirm that the costs and benefits for this project are reported against project number 30072.

The findings of project-specific audits are summarised below.

Drumelzier WTW Upgrade (30220)

The project originally consisted of the provision of sodium hypochlorite dosing and a contact tank to improve disinfection and address coliform issues at a very small water treatment works with a maximum summer population of 35. The driver codes of DW3B (Coliforms), DW3D (Bromate) and DW13 (Aesthetic) have been correctly allocated. The estimated cost at CAPEX2 stage (February 2007) was £340.000. Because of problems with land purchase and the difficulty in meeting the required regulatory delivery date of July 2008, options were reviewed and it was decided to connect the Drumelzier system to the Broughton WTW by a new main and abandon the WTW, at an estimated cost of £416,000, based on SW standard unit costs. These unit costs do not cater for site-specific costs.

Tenders were sought from a local contractor who, because of his local organisation and local knowledge was able to offer cost savings including minor route changes resulting in savings by routing mains through fields rather than roads. The work is now complete with CAPEX5 expected in July 2008 at a forecast cost of £280,000. This is in agreement with the Table G6 total cost.

The abandonment of the WTW will result in an overall reduction in Opex, although this is allocated to the separate projects to abandon the works. The linked Q&S2 projects Broughton and Drumelzier Water Supply (29) and Drumelzier (7054) do not however show any reduction in Opex.

Environmental FTP Clachan Seil/Balvicar (32004)

A first-time sewerage provision project to serve 163 properties on the Isle of Seil and provide environmental improvement to shellfish waters. The project driver of SG3 is correctly allocated for first time provision. Costs have risen significantly from the CAPEX 1 estimate of £6.224m (based on a notional project with unit rates) to the current CAPEX 3 estimate of £8.019m (based on a defined project with actual framework contractor's rates). Table G6 shows a total cost of £8.220m. Costs include the cost of house connections. The number of properties to be served has increased from 153 at CAPEX 2 to 163 in the current project but this is not a significant cost factor as the total length of sewer is almost unchanged. Additional cost is associated with the need for an enhanced MBR plant to meet microbiological standards. There is good confidence in the current estimate.

The project is programmed to be in use by the end of December 2008, in line with the agreed regulatory deadline, but there is some potential for delay due to deep trenching in

gardens. The project will result in increased Opex of £93,000 p.a., which is in agreement with increased Opex stated in Table G6.

Internal Flooding – Glasgow Morningside St, Ruchazie Rd, Edinburgh Rd (33048)

The project is for the removal of 17 properties from the at-risk flooding register. The driver of CS11 is correctly allocated. The project was promoted as part of the sewer flooding programme, which covers the removal of a total of 458 properties. The project consists of 80m of 1050 mm diameter tank sewer, overflowing into a new 375 mm diameter relief sewer. The work is now complete with a CAPEX 5 estimate of £0.553m. This project was accelerated from the Q&S3 programme to deliver benefits in the Q&S2 period and is reported in Table G5 under project number 12045. No capital maintenance enhancement arises from the upsizing of the tank sewer as the pre-existing sewer was not in condition grade 4 or 5.

WTW Capital Maintenance – Shapinsay Boreholes (33350)

The existing boreholes on Shapinsay pose a potential risk of contamination by Cryptosporidium and some health and safety issues due to underground borehole heads. Only one actual failing Cryprosporidium sample has been recorded. The driver of WSNI relates to capital maintenance and has been correctly allocated. The options of drilling new boreholes or providing a link main to the Orkney mainland were considered and rejected in favour of improvements to the existing boreholes to extend their life in the short term as it is anticipated that either of the rejected options may be required in the medium term. The design is now being finalised and no formal estimate is available but the engineer estimates that cost will be in the region of £0.2m. Table G6 shows a total cost of £0.199m. Work is forecast to be complete by January 2009 and there are no significant external risks to this programme.

Glasgow - Elmvale Road, Springvale Flooding (34966)

The project is to remove 10 internal floodings from the at-risk register by improving an unsatisfactory connection subject to repeated blockages. The work is now complete and the cost is expected to reduce significantly from the CAPEX 1 figure of £35,000, but CAPEX 5 has not yet been submitted due to difficulty in agreeing costs with Scottish Water Contracting. Table G6 shows a total cost of £15000, which corresponds to the engineer's estimate of reasonable cost. There is no change in Opex as a result of the project. The output measure code is shown as Ww1, but it is not clear that the properties have been removed from the register. It is recommended that this should be checked

Dunfermline Eastern Expansion (DEX) (36049)

This project, to cater for domestic development on the east side of Dunfermline, is currently at CAPEX 1 stage (approved June 2007), with an estimated cost of £4.894m. The output measure code of WG1 is correctly allocated. The growth to be catered for is 2500 domestic

properties at defined locations, with a further 2500 possible domestic properties at undefined locations within the WOA. After modelling, two options have been costed. The first caters only for committed development at a cost of £3.14m. The second caters for committed plus possible future growth at a total cost of £3.40m. When it has been decided which option to pursue, CAPEX 2 will be submitted (expected to be July 2008). Table G6 shows a total cost of £4.894m.

Construction start is expected in early 2009/10 and no difficulty is anticipated in completion by the end of the current programme period. No formal risk register has yet been drawn up but no unusual difficulties are anticipated. As this is a growth project there is no regulatory deadline. Overhang into SR10 has been calculated using the project template as £95,000 (engineer's estimate) although CIR Q3 shows £78,000. Contributions are expected from developers. No synergies with capital maintenance are currently identified. If these emerge during the development of the project (for example supply interruptions or pressure problems) the project drivers will be adjusted. It is the responsibility of Scottish Water Capital Investment Department (CID) and Capital Investment Team (CIT) to agree changes.

WOA000209 Kettleton Mains Rehab (36128)

This project is to eliminate bursts. These are in small-diameter mains mainly of asbestos cement, but also with some steel and uPVC lengths. The project currently has CAPEX1 stage approval (dated July 2007) with an estimated cost of £2.789m. Burst data have been obtained from Perform Spatial Plus (PSP), which is updated quarterly from GIS, but this does not currently indicate a burst frequency sufficient to proceed with the project, as the threshold value of 204 bursts/1000 km required for the DOMS strategy is not met. Unrecorded bursts are believed to have occurred and operational records are currently being checked. The programme has not yet been defined, but this project is scheduled to be deferred to SR10. Table G6 shows a total cost of £13,000 and CAPEX5 by 25.3.2010. As this is a capital maintenance project there are no regulatory issues, grants or contributions involved. The driver of WSI has been correctly allocated.

Milton Street, Airdrie UID (36548)

This project is to eliminate an unsatisfactory intermittent discharge noted in SEPA's Technical Expression. Following studies begun as part of the Start Early programme, CAPEX1 was issued in October 2007. The drivers of EC01, EC04 and EC10 have been correctly allocated. The estimated cost at CAPEX 1 stage was £20,000, for a short, straightforward cross-connection to a parallel sewer as yet not constructed. Owing to its location in a heavily-trafficked area, inspection was not possible until very recently, when it was found that the overflow had in fact been bricked up. It is not known when this took place or how the overflow continued to remain on SEPA's UID list. The project will be removed from the programme with SEPA's agreement. Table G6 shows a total cost of £1.357m.

Ballachulish, N Ballachulish and Glencoe WWTP Upgrade (36588)

Following a strategic study of discharges into Loch Leven, it was decided that the most economical solution was a combined solution to provide improved treatment for these three communities and cater for a small amount of Local Plan growth. The project drivers of EC01 (UWWTD), EC03 (Shellfish) and SG1 (Growth) appear to have been correctly allocated. The project consists of the provision of gravity sewers, pumping stations and rising mains, an under-sea crossing and septic tank treatment. Construction work has been split into two packages. The first, consisting of sewers, pumping stations and rising mains is now on site. Package two, consisting of the crossing and septic tanks is dependent on achieving planning permission for the septic tank site, which is subject to a planning appeal. The current forecast completion by September 2009 is dependent on the rapid resolution of this appeal by means of a written procedure, giving rise to the potential for delay. The current cost estimate is £5.128m. An increase in annual Opex of £39,000 is forecast, based on the Opex model and taking into account reductions due to the abandonment of existing WWTWs. Table G6 shows no Capex or Opex cost against this project number. However Scottish Water confirms that the costs and benefits for this project are reported against project number 30072.

*Q&S3 Study Programme Audits*

During our audits of the Q&S3 programme we carried out reviews of study programmes to obtain an overview of the management and progress of the programmes and to understand how sub-programmes of work were represented in Table G6. From these audits we concluded the following:

*UID Programme*

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 with a value of £26m, £23m of which is shown post-2009/10. Where projects have been defined and released to delivery teams, the individual project 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 £181 million. The current projected spend for the overall programme is £161 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 certainty of the complete budget confirmed, the Company has opted not to report changes to date.

The programme of UID studies is not yet complete. In particular studies relating to the Meadowhead and Stevenston catchments are not forecast to be complete until 31.3.09, ten months after the Delivery Plan date. This will result in a delay to the completion of the necessary UID work in these catchments until September 2011.

*Water Resources Studies*

This work is being progressed through joint workshops involving Scottish Water, SEPA and WICS. The programme consists of 78 studies. Of these, 40 consist of licence issues only. These are being worked through with 21 signed off and the remaining 19 moving

satisfactorily towards resolution. 38 locations require studies and the quantification of costs and there is good confidence in completing these by 30.9.08.

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 investigation works only where these showed that no works were required. In other cases reviews to the water resource and quality drivers have resulted in major revisions to projects which are likely to result in delay and increased costs.

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 it to proceed. Where there is an obvious standard process solution, the CAPEX2 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 CAPEX3.

Scottish Water expressed some cause for concern where the agreement of proposals was required by SEPA, owing to the time which this might take. This adds an element of uncertainty to the timing of some projects and the completion of the water quality programme as a whole.

Progress on delivery of individual outputs is described in more detail in the commentary on Table G7 (Q&S2 Output Delivery), G8 (Q&S3 Ministerial Objectives) and Table G9 (Q&S3 Ministerial Objectives – Serviceability)

*Q&S3 Third Party Risk Review*

Third party issues affecting construction projects include planning permission, site acquisition, site access, power and telephone connections, environmental constraints, telemetry and street works and customer issues. These types of third 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 for the investment programme. From these discussions we noted a co-ordinated approach to the management of third party issues in the Q&S3 programme which draws on lessons learnt from delivery of the Q&SII programme.

We noted a structured approach to identifying and managing third party risks, using a central resource of specialists in planning, land access, land acquisition, environmental issues, utilities and customer issues. Individual specialists are aligned with area teams and individual senior project managers to assist identify risks and ensure that they are managed centrally. The aim of these specialists is to anticipate and avert potential delays by timely action to obtain necessary permissions, supplies or other agreements in good time. To this end the planning team has access to the project management system P3e and runs a reminder system for project managers on these issues. Standard procedures are in place showing the key stages and sequence of actions required for key third party issues. Pro-forma documents are available for the completion of submissions.

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 identifying key risks and relevant project milestone dates to 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.

The third party risk management team carries out the following main functions:

Planning permissions:

- build up relationships with local authority planners
- advise on planning requirements in advance of submitting applications
- handle appeals

Land

- manage interface with land agents
- advise on serving of notices
- manage landowner appeals on notices
- manage CPOs

Environmental

- establish needs and likely costs of environmental measures
- obtain consents and licences

Utilities

- develop frameworks with suppliers
- apply for supplies
- manage wayleave issues
- arrange connection with metering Company

Customer

- screen projects for customer impact
- advise on and develop communications plan, scale dependent on impact

From our discussions, 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 third party risks. This will significantly reduce the risk that delays will occur in Q&S3 due to these issues. However, by their nature, third party risks cannot be fully controlled and it is likely that some projects will be delayed as a result. This remains an asymmetrical risk where successful delivery of most of the programme will not balance out the impact of the limited number of risks which materialise.

*Progress through CAPEX 3.*

From our individual project audits and an analysis of Table G6 we noted that significant progress has been made during the past year on bringing projects to CAPEX3 approval. Almost 70% of projects in Table G6 had reached or passed this stage by the end of the report year. This greatly reduces the potential for significant changes to projects as they are developed and have scope and estimates refined.

*Q&S3 CAPEX 5 Dates*

In the Q&S2 programme CAPEX5 dates indicated beneficial use. We understand that the Q&S3 CAPEX5 dates are intended to signify quality regulator sign-off for appropriate projects, known as 'Acceptance'. 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 can take significantly longer, depending on the regulator involved. 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. A formal and well-documented process is followed by Scottish Water to achieve and record regulatory sign-off. We have also noted that in the reporting of the achievement of regulatory outputs in Tables G7-9, delivery of the output is in most cases claimed when internal sign-off is achieved, rather than sign off by the external regulator, which can be significantly delayed, particularly in the case of SEPA.

## 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.

As we noted in our report on AR07, a number of outputs reported in lines 1 to 9 at beneficial use date have been waiting for some time for regulator sign-off, in one case since 2005, but still have not been signed off. The longest outstanding case is understood to be due to the need for remedial works on a site linked to the site in question. 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.

### 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, developed by the DWQR, SEPA and Scottish Water have been in place since before the AR07 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; or
- 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 sign-off for 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.

As we noted in our report on AR07, a number of outputs reported in lines 1 to 9 at Beneficial Use date have been waiting for some time for regulator sign-off, in one case since 2005, but still have not been signed off. The longest outstanding case is understood to be due to the need for remedial works on a site linked to the site in question. 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.

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.

**Comments 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. All of the outputs on these lines were delivered before the beginning of the report year. There is therefore no target for this line going forward.

*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 2007 as 1391, fully meeting the Q&S2 target. There is therefore no target for this line going forward. These properties were removed from the register before March 2006. 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 was 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 3, 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 one case, a sign-off sheet was submitted to the regulator in 2005 and has been signed off due to the need for remedial work on a linked site.

It was noted that for line 3 the total of outputs delivered to the end of AR08 and future targets (592) is lower than the Ministerial target of 599. This is due to the removal from the target of outputs at Ballater (4) and Blackpark (1). In addition Scottish Water is seeking DWQR support for the removal of 2 no. outputs at Shieldaig and the substitution of an area solution in Q&S3b.

It was noted that for line 5, the total of outputs delivered to the end of AR08 and future targets (585) is lower than the Ministerial target of 589. This was stated to be due to the removal from the targets of four continuous discharges related to Loch Ryan improvements, where the remaining funding is inadequate to meet the cost of required improvements. Scottish Water stated that these four outputs have been removed from the target, but this is not reflected in line G7.5 as the ministerial target from the start of 2007/08 has been retained to reflect that Loch Ryan output delivery requires funding.

*Line 4 and 8 – Rehabilitation of Water Mains and Sewers*

Delivery of these outputs was completed before the beginning of the report year. There is therefore no target going forward. 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 6 – Removal of properties from the at risk flooding register*

The Company reported 830 properties removed from the at-risk registers up to March 2007, exceeding the target of 829 properties for Q&S2. There is therefore no target for this line going forward. Based on our previous audits we consider the Company's report to be reasonable. For some named schemes in the WIC18 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 WIC18 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*

These lines were not audited for AR08

*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 are set out above. During our audit we were able to confirm our initial views that 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.

**Confidence Grades**

The confidence grades allocated are generally supported, being based for the most part on auditable systems and accurately determined data.

## 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 or exceeded its cumulative targets for the first two years of Q&S3a. Output delivery has gathered pace after the slow start on quality outputs envisaged in the Delivery Plan while Scottish Water developed 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. The totals forecast to be delivered by the end of 2009/10 significantly exceed the Ministerial Target

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 has resulted in the forecast completion of construction of all UIDs in the Meadowhead and Stevenson catchments being rescheduled to the end of September 2010, beyond the end of the current investment programme period. Scottish Water remains confident that the outputs will be achieved and has set up a project management office and area activity teams and engaged consultants to that end.

Water quality outputs are well-defined. Wastewater quality outputs may be less well-defined, being defined for example by reference to improved water body quality. In these cases Scottish Water follows a process of agreeing in advance what solutions will be required to deliver the output.

### Methodology

In addition to taking data from CIMS, project managers are required to confirm regulatory acceptance using paperwork which also confirms the outputs delivered. Scottish Water has appointed managers responsible for individual lines in the tables. They maintain tracking spreadsheets and meet project managers on a monthly basis to challenge and agree the delivery of benefits. No-build solutions may be included so long as the required benefits are delivered. The Company provided detailed lists of outputs which have reached beneficial completion in the report year. We recommend that these are maintained as a cumulative list for future years. There is also an agreed change process for targets where changes have to be signed off first by the quality regulator, then by the Outputs Monitoring Group and then by WICS. Quarterly targets within the year are agreed based on the scheduled completion of the relevant projects.

**Comments by line**

*General*

Outputs in this group have a common audit trail. This was followed from the Technical Expression to individual projects. Changes in the required engineering solution were also traced.

It is noted that while targets are stated in the table as cumulative totals, outputs are stated as individual totals for the year. This is confusing and it is recommended that WICS considers amending this requirement.

*Line1 – Customer Service*

Customer service outputs covers the number of wastewater treatment works where an 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.

Following the approval of odour management plans by SOSG, Scottish Water Solutions are developing the work identified in the odour improvement plan into detailed scopes of work and 7 projects have been completed in the report year, in addition to the one output delivered in AR07. The running total of 8 outputs exceeds the cumulative target of 5. Given progress so far, the stage of project development and the type of work, we believe that the proposed targets are reasonable and achievable.

*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 WTW 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 1515 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 and 41-49 – Number of UIDs Improved and UID Strategic Studies*

The process for collection of data and sign-off is as described under Methodology above. The Technical Expression listed 277 UIDs. Scottish Water has agreed locations and the problem type (aesthetic, inland water quality or coastal water quality) with SEPA. The programme of studies is well advanced and optimum solutions have been agreed with SEPA for all major catchments. The programme of studies has clarified which problems are associated with which overflows and resulted in some substitution and changes to proposals. Removals from the list due to errors are not claimed as outputs, but removals following studies or works are so claimed.

*Lines 13 and 15 – WWTW Discharges Improved to Meet New and Existing Consent Requirements*

The process for collection of data and sign-off is as described under Methodology, above. Targets are as agreed with SEPA for the Delivery Plan. Changes have been agreed to the targets for AR08 with the agreement of SEPA; from 14 to 11 for line 8.13 due to the re-phasing of projects and from 7 to 6 for line 8.15 due to project amalgamations.

*Line 14 – Number of First Time Provision Projects To Meet Environmental Objectives*

The process for collection of data and sign-off is as described under Methodology, above. One output was delivered in the year (Tobermory)

*Line 16 – Number of Management and Monitoring Systems at Works to Meet IPPC Regulations*

The process for collection of data and sign-off is as described under methodology above. The original target for this line of 61 sites was based on SEPA's initial interpretation of legislation. This was challenged by Scottish Water and reduced to one site (Broadside), which was completed during the report year. 35 sites were removed as being below the threshold capacity, 10 on the grounds that land disposal was of sludge not waste, 10 on the basis that sludge was retained for less than one year and 5 sites are to be closed.

*Line 17 – Number of Landfill Sites Contained, Monitored and Decommissioned.*

The process for collection of data and sign-off is as described under Methodology above. The original target was 12. Five sites were added following reclassification from line 8.16 above, making a new target of 17 sites. Of these, 8 have been closed during the report year, compared with an annual target of 4.

*Lines 18 – 19 – Provide Strategic Capacity at Wastewater and Water Treatment Works*

The reported provision of strategic capacity at water and wastewater treatment works is based on proposed additional capacity (or reduced leakage) 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 31st March 2010.

Capacity is delivered through the completion of identified growth projects. Targets, set in the 2006 Business Plan, were based on statistical modelling, current works capacity and local authority growth predictions. The latter were moderated in the Growth Model and agreed by the Minister. Since the agreement of the original targets (40000 p.e. for wastewater and 16500 p.e. for water), Scottish Water has planned further growth projects such that forecasts (42094 p.e for wastewater and 174693 p.e. for water) now greatly exceed the original targets. These figures and quarterly targets have been built into the annual Business Plans as revised targets. This leaves Scottish Water vulnerable to perceived under-delivery of outputs in case of slippage even though actual delivery is likely to greatly exceed the original target. Population equivalent relieved is calculated from p.e. data and local authority occupancy rates. The programme consists of 235 projects, less 31 deferrals, making a total of 204. Of these 115 have CAPEX3 or greater approval. Achievement of targets depends on continuing to make good progress in developing project solutions.

*Lines 24 –29*

These lines were not audited for AR08

*Lines 30 to 40- Water Resources Studies*

A programme of 78 studies has been agreed with the quality regulator. Of these 40 consist of licencing issues only. Of these 21 have been signed off by SEPA and the remaining 19 are moving satisfactorily towards sign-off. 38 cases require investigative work. All of these are at the stage of study or option development. The work is being progressed in joint workshops with SEPA and WICS, a project management office and area activity teams have been set up and consultants have been engaged. The project manager expressed good confidence in reaching the stage where all costs have been quantified by the target date of 31.10.08 (line G8.40), but this is dependent on third party approval by SEPA, which represents a risk to progress.

*Lines 50 to 54 – Progress with Quality and Standards 3 Sign-off*

We reviewed the Q&S3 sign-off process in our audit of the 2006-07 Annual Return. Our comments on the methodology are set out above. During our audit we were able to confirm our initial views that 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.

### Confidence Grades

Given the reporting and approval arrangements in place we believe that the confidence grades reported for actual performance and targets up to and including the current year are reasonable.

## 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 most 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 have resulted in a step 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 reported serviceability performance assumes that targets will be met by March 2010. However 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 therefore not possible to confirm that the necessary outputs will be achieved by March 2010 in all cases.

### 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. In some cases reported actual performance is already significantly better than these forecast levels.

### Comments by line

Lines 1-3 Performance is reported for the 2007 calendar year so the figure reported for March 2008 is actually the figure for December 2007. Performance is well ahead of target for lines 1 and 3, but has deteriorated for line 2 (% compliant zones for manganese). Information on failures comes from LIMS. Only regulatory samples are used. A single failed sample in a zone results in a failed zone for that year. The audit trail was followed from manganese sample data to the reported figures. As the number of failures is likely to increase as the year goes on, quarterly performance figures give the impression of good performance at the start of the year with a deterioration as the year progresses. The forecast of future

performance is based on a rolling 3-year record of performance, taking into account any investment planned.

Line 4

Reported performance of 5907 is well ahead of the target of 12957. This is partly due to a robust review of properties at risk which resulted in a significant removals from the risk register due to improved information during report year 2006/7. Initial data on properties affected comes from PROMIS. All reports are investigated and only entered onto the register after logging. The low-pressure log holds much historical information on spreadsheet, including 7-800 properties in around 200 WSZs with no addresses recorded. It is not known where these properties are or how valid the problems are. The spreadsheet is being cleansed and this is scheduled to be complete by August 2008 for entry of the data onto the corporate database.

At present, there is no reason to believe that performance should revert to the higher target levels in future years. The post 2009/10 target of 120 appears very challenging.

Line 5

Reported performance of 1600 is well ahead of target of 16,141. This is due to additional focus on this performance measure, in part to meet OPA targets. Data originates with customer complaints recorded on PROMIS. All complaints are investigated and after restoration of supply, information on the incident is provided by operators either on paper or hand-held recorders for input to corporate data systems. Guidance notes are used by operators to define the start and finish of an interruption. The number of properties affected is estimated using information on network operations to resolve the incident. Scottish Water proposes to put in place an improvement team to investigate procedures and documentation in this area. At present, there is no reason to believe that performance should revert to the higher target levels in future years.

Line 6

Reported performance of 196 is ahead of the 204 target. Bursts are recorded in WAMS, both reported (via PROMIS) and unreported (found through active leakage control). WAMS data distinguishes between the type of pipe affected and guidance notes are used to distinguish these.

Line 7

Reported performance of 563 is well ahead of the target of 1,603. The target was set as part of the preparation for the SR06 Business Plan, based on extrapolation of a single months data and now appears high compared with recent actual floodings. The longer-term target post 2010 is set at the lower and more challenging level of 366 properties.

Future performance is based on an average rate of additions of 6 per month, less improvements due to investment. Significant variation should be expected in the numbers of incidents occurring year on year. After work is carried out to resolve reported problems PROMIS is updated with a resolution code. The fact that some WAMS jobs have no resolution code stated and that it can be difficult to decide whether a flooding arises from a sewer, lateral or house connection is reflected in

the confidence grade for this line. Scottish Water has recently instituted a flooding investigation team to investigate all floodings and review the at-risk register and PROMIS data to determine cause. 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 number of floodings has reduced from AR07 but at 767 still remains well above the target figure (366) Significant variation should be also expected in the numbers of incidents occurring year on year. Floodings are investigated as described for line 7 above. At present, there is no reason to believe that performance should revert to the higher target levels in future years.

Line 9

The number of failing wastewater treatment works is the number of works failing at the end March 2008 based on the regulatory monitoring carried out by SEPA. It includes PPP treatment works. The reported number of 30 is below the target of 39. 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 reviewed the number of unsatisfactory intermittent discharges for AR07 and restated the baseline position. The original target was based on a reduction of 277 UIDs over the Q&S3 period. The revised target is based on addressing 315 UIDs over the Q&S3 period, 38 more than planned. The number of outputs to be delivered in the final year of Q&S3 has increased to reflect the revised milestone dates for completion of studies, design and receipt of tenders.

Studies have identified some additions and removals, made with the agreement of SEPA. Records of SEPA sign-off are retained. We recommend that consideration is given to how these changes are reflected in the serviceability targets. UIDs can only be removed from the register if SEPA agree that following investigation the problem is not substantiated, if work is done as part of a UID project, or a UID is removed as part of another project, such as a flooding project.

Line 11

The number of pollution incidents has been reported for the first time in AR08 against definitions realigned with practice in England and Wales. Data are held on a spreadsheet which draws information form SEPA's ELMS system for recording all pollutions and Scottish Water's PROMIS system. Incidents are recorded on the spreadsheet if internally verified even if they are not witnessed by SEPA. There is not currently a robust system for ensuring that all pollution incidents are identified from PROMIS and operational data. As noted in our report for AR07, it appears that the new standards have caused a step change in the number of reported incidents. Consideration should be given to adjusting the

target to reflect the new reporting standards as the post 2009/10 target of 438 will be harder to reach than previously expected.

**Comments by confidence grade**

Confidence grades are largely unchanged from last year's final published report which Scottish Water had revised following our comments that we did not believe that the confidence grades for forecasts in lines 3, 4, 5, 6, 7, and 8 were appropriate given the current year figures and the introduction of new reporting requirements for pollution incidents.

# 9. SECTION H: ASSET INVENTORY

## 9.1 Overview

As a part of the SR10 1st draft business plan submission, Scottish Water has undertaken a major re-valuation of its assets. As a result, its valuation has increased from around £30 billion to £36 billion.

The results are presented in tables B1 to B9 of the business plan and tables H1 to H6 of the Annual Return. During our audits we reviewed both sets of tables and found them to be compatible. Scottish Water confirmed that there were no differences.

The findings of our audits are fully described in Appendix B of our report on the 1st draft business plan and, with the agreement of WICS, are not repeated here.

In the key points below we make some observations required in the Reporting Requirements and note some further points arising from our work.

*Key Points*

- Scottish Water has made a complete return of its current asset inventory in Tables H1 to H6.
- This year, for the first time, Scottish Water has presented its asset valuation on a Modern Equivalent Asset Value (MEAV) basis. We believe that the work is more robust than previous valuations.
- The data presented in AR08 excludes redundant and decommissioned assets. These assets have therefore not been revalued for the current submission. This has resulted in a significant reduction in inventory reported for water treatment works, water storage, water pumping stations and wastewater treatment works.
- A further significant change is that all assets have been revalued using updated cost curves based mainly on Scottish Water's own unit cost data, but partly on industry standard unit costs.
- It would be practicable to report a breakdown of MEAV on a 5x5 matrix of condition versus performance. This presentation would give a better representation of the MEAV in certain condition/performance groupings. However, we are not convinced reporting annually on this basis will provide a significant benefit to Scottish Water or to the WICS.
- We have not identified any general comments relating to asset serviceability in the Annual Return. Scottish Water has not made any assertion as to the relationship between the condition and performance assessments for any asset group, nor any statement regarding the capacity of asset groups to fulfil their specified role regardless of relative condition or performance.
- It would be practicable to report "support services" valuation with a water/wastewater split. However, we do not think that such a split would add greatly 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 standalone item.

- The use of MEAV, or similar valuation, 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. The MEAV valuation presented is an improvement on the EARC valuation presented in previous asset valuation for the Annual Return and has removed the anomaly whereby very large values of assets were previously indicated as requiring replacement within two years.

- In the report year, Scottish Water has continued to make changes to its asset inventory to account for surveys, investment, data cleansing and data improvements mainly associated with the condition and performance grading of infrastructure assets. Work carried out for Scottish Water has provided significant new data on long sea outfalls, dams and impounding reservoirs and raw water intakes although issues remain over the yield of dams and intakes.

- Site checks on a sample of Scottish Water's asset surveys revealed some discrepancies in inventory, condition and performance data recorded and we suggest that Scottish Water continues to check and refine its asset inventory, particularly on its water treatment works assets.

- The assessed gross MEAV of critical and non-critical sewers is significantly increased from the EARC figure reported for AR07 due to moving away from previous practice where a default depth of 1.9m was used for all sewers having an unknown depth, to applying a range of depths in the same proportion as the depths known from surveys. Costs are very dependent on the laying conditions (road or grassland) recorded on the GIS. We have not audited the quality of this data.

- Scottish Water has generally retained the confidence grades of the asset valuations at those previously reported.

- 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.

- Support services have generally been valued as in the past given that many have short lives. IT valuations are of hardware only. Scottish Water's non operational buildings have been surveyed for size, condition and performance but have not been re-valued. We believe that current valuations are uncertain.

# 10. SECTION P: TARIFF BASKET INFORMATION

## 10.1 Overview

*Key points*

- Except where described in the commentary 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 for both AR08 and SR10 during the same audit. Through the audit it was possible to verify that measured and unmeasured non-domestic property information is derived from Business Stream billing system, Hi-Affinity, which also provides data used to prepare the WIC 22 reports. Customer numbers are reported at September 2007 while the reported volumes cover all customers served in the report year.

- Hi-Affinity is now owned by Business Stream and as of the end May 2008, Scottish Water no longer has access to the data. This may have significant implications for the quality and accuracy of future annual returns.

- Scottish Water has implemented the Ellipse system as the asset inventory for revenue meters which remain the responsibility of SW along with meter reading. Routines will require to be developed to ensure that the data held in Ellipse and supplied to the CMA remains synchronised.

- Scottish Water's report on unmeasured domestic properties is based on 2007 WIC4 returns from councils. Growth is calculated from the GROS and WIC4 of 2004 and 2007. The figures are then profiled into the format required for the P tables.

- The tables reflect the 10.6% reduction for wholesale tariffs.

- For this return, Scottish Water has adopted an earlier methodology for the tariffs in Table P12 to ensure that the reported revenue to trade effluent equals the actual revenue.

## 10.2 Tables P1 to P10

### Comments on methodology

Methods used to calculate the numbers to populate the A and P tables are 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

The source of the data for unmeasured households is the 2007 WIC4 returns from municipal councils completed at mid year. The figures are re-profiled into the format required for the P tables. The data was 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. Report Year +1 forecast is based on the AR08 numbers updated with new growth data from GROS. The WIC4 data has been compared with the Ctaxbase data which was used more extensively in previous years for growth and exempt property estimation.

The 2007 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.

There is no longer a discount for second homes and long term empty properties.

The 2007 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. Scottish Water assessed the 2007 WIC4 data to be more robust than previous years and was able to use it directly for the tables with processing limited to re-profiling for the P tables formats.

At the audit we were able to follow the calculation process through to lines reported in the P tables.

The total number of properties connected to water supplies, including exempt and void properties, is 2,368,648 which is an increase of 26, 234 since last report year.

The total number of properties connected to wastewater supplies, including exempt and void properties, is 2,280,706 which is an increase of 17,782 since last report year. Lines P5.37 + P5.48 equals line A1.12.

Band D Equivalent Calculation

The Band D equivalent calculation is generally as for previous returns, but takes into account the changes in discounts. 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 A, 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*.

The water services Band D equivalent figure for this year has increased by 44,980 (2.4%) to 1,908,122. The increase is reported to be due to the more reliable source of data, household growth and properties that in the past were connected but not billed.

The wastewater services Band D equivalent figure for this year has increased by 35,719 (2.0%) to 1,815,179.

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 for unmeasured non-domestic properties and for all measured properties has been taken from Scottish Water's Hi Affinity billing system using a download taken at September 2007. High Affinity holds all data on rateable values, billings and revenue which form the basis of the tables. Scottish Water produced a set of query routines to generate the outputs from Hi-Affinity for the Annual Return. Sample routines were audited in previous years. However, following the setting up of Business Stream, Scottish Water's access to Hi-Affinity has terminated. The queries processed before access was stopped have been used to generate the information used in both the A and P tables. The tables are therefore consistent.

Scottish Water has installed over 30,000 meters out of a planned total of about 40,000 to convert virtually all unmeasured non domestic customers to metered supplies. 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. Because of the planned metering of all unmeasured non-domestic customers by 2010/11, there have been virtually no requests by "optants" to switch to a metered supply during the year. Report Year +1 forecasts have not been included in either the A or P tables for measured properties.

*Tables P3 and P7 – Measured Domestic*

Scottish Water has very few measured domestic properties. The methodology adopted for previous years was used for this return. The number of measured domestic properties reported was processed from data downloaded from Hi-Affinity at the end of September 2007. As stated above the process was audited in previous years, but access to H-Affinity is no longer available to Scottish Water. 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.

Scottish Water reports a reduction from 595 to 530 Water service – Measured households. Table P3, line P3.1 AR08 agrees with Table A1, line A1.2. However the P table forecasts a 15% increase for Report Year +1 to 609 which is not included in Table A1.

The total water volume for measured household properties in Line P3.11 is 64,553 $m^3$ which represents 55% of the reported volume (116,715 $m^3$) in AR07. The AR08 Report Year +1 Forecast of 118,312 $m^3$ represents a growth on the previous year, but does not appear to reflect the change in property numbers. The reported total volume in line P3.11 (in $m^3$) does agree with the table A measured household volume (reported in Mld). Scottish Water states that the differences better reflect work undertaken for SR10 to resolve data billed volume migration issues.

Scottish Water reports a reduction from 222 to 180 Wastewater service – Measured households. Table P7, line P7.1 AR08 agrees with Table A1, line A1.13. However the P table forecasts a 10% increase for Report Year +1 to 198 which is not included in Table A1.

The total wastewater volume for measured household properties in Line P3.11 is 12,229.56 $m^3$ which is 59% of the reported volume (20,805 $m^3$) in AR07. The AR08 Report Year +1 Forecast of 118,312 $m^3$ is the same volume as reported for line P3.11. The reported total volume in line P7.11 (in $m^3$) does agree with table A1, measured household volume (reported in Mld). Scottish Water is aware of the discrepancy and we understand that the lines will be corrected.

There is an implication in the numbers reported between Table P3 and Table P7 that the wastewater volumes equal the water delivered volume whereas in Table A1, a return of 95% is assumed returned to sewer.

*Table P4 and P8 – Measured Non-Domestic*

For comments on the methodology used in this table 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 (or 366 in the case of a leap year) days when meter readings had been taken. The 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 whole of the 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 chargeable 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 chargeable size used for tariff calculations.

There has been a reduction of 2,758 meters since last year mainly due to removal from the figures of a large number of "billed no charge meters" in response to queries from WICS in 2007.

The total volume of water delivered (line 4.29) is not consistent with the water delivered figure at line A2.15, nor is it consistent with line P8.23 being 95% of water taken. Scottish Water states that the difference represents the difference between "billed" and "supplied", where the latter includes underground supply pipe leakage and an estimate for meters with no reads at the end of the year. The water balance does not include the calculation for an estimate of meters with no readings (representing approximately 20/90 Ml/d). We recommend that for future returns Scottish Water includes a reconciliation in the commentary to explain any differences between the lines including the proportion of sewage volumes derived from measured non-household water delivered. The total volume from measured non-domestic properties (line P8.23) 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 Business Stream's 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 172 of the 180 measured domestic properties connected to the sewerage service. Property drainage charges are applied to 163 properties. The data was derived from the Business Stream Hi-Affinity billing system.

24 non-household properties pay area based charges (line P10.1). 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 which are not necessarily available now.

Properties paying non-standard tariffs relate to special agreements. The number declines as the agreements expire. Scottish Water is not entering into new special agreements as a result of the new wholesale market now in operation. We understand that all special agreements relating to drainage charges will have expired by 2010.

We understand that the Scottish Government is consulting on drainage charges based on area as opposed to the general basis of charging on rateable value. Scottish Water is developing a methodology and GIS based tool to assess area of properties paying drainage charges.

## 10.3 Tables P11 and P12 – Trade Effluent

### Comments on methodology

The figures reported in the return are the annual volumes at year end. 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.

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.

There has been a significant increase in the number paying standard rates. WICS requirement for Scottish Water to eliminate the trade effluent cross subsidy mechanism by removing the caps on some discharges by 2010 is resulting in the numbers transferring from Table P12 to Table P11; the number paying standard rates has increased by 169 to 799 and the number receiving harmonised cap has reduced by 277 to 782. In addition some trade effluent discharges have been transferred to the non-household standard tariff structure.

The billed trade effluent volume from non-domestic premises is estimated in one of four ways:

- Direct measurement of trade effluent flows. This is used for a 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 in relation to the revenue raised.

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 choose 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.

For Table P12, Blocks E and F are back calculated to make the composite tariffs match the revenue received during 2007/08, £8.7 million. This is necessary because not all dischargers paying published rates receive full treatment, but the formulae used to calculate P12.38 to P12.41 assume that they do, resulting in overestimating revenue.

Trade effluent discharge 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 25 and 30 to 33 which do not reflect the reduction in revenue from harmonisation caps.

The charges for 2008-09 are the same as the reported retail charges for 2007/08. The forecast charges do not reflect the Wholesale Charges Scheme for 2008-09 which came into effect in April 2008.

## 10.4 P Table Confidence Grades

In general Scottish Water has reported confidence grades of:

- A1 for tariffs,
- A2 for numbers, volumes and loads discharged for AR08 and A3 for Report Year +1 (2008-09).
- A2 for revenue.

Scottish Water has assigned a confidence grade of A2 for unmeasured properties by band, the same as the overall confidence grade in table A1. For this return, Scottish Water has used externally supplied data set and applied a minimal amount of data extrapolation. Scottish Water has no control over the quality of data supplied beyond undertaking checks for the different data sources, for example 2007 WIC4 and Ctaxbase. Overall we accept the grade.

Tables P1 and P5: The confidence grade has changed from B2 in AR07 to A1/A2/A3 and reflects the source of data being the WIC4 returns. Grade A3 has been assigned for Report Year +1 (2008-09) Forecast. We accept the grades.

Tables P2 and P6: The A1 and A2 confidence grades are unchanged from last year for AR08, but Report Year +1 (2008-09) no forecasts have been made. We accept the grades.

Table P3 and P7: The A1 and A2 confidence grades are unchanged from last year for AR08, but for Report Year +1 (2008-09) the forecast has been lowered to A3. We accept the grades.

Table P4 and P8: The A1 and A2 confidence grades are unchanged from last year for AR08, but for Report Year +1 (2008-09) no forecasts have been made. We accept the grades.

Table P9 and P10: The A1 and A2 confidence grades are unchanged from last year for AR08, but for Report Year +1 (2008-09) no forecasts have been made. We accept the grades.

Line P10.13 is from historic inherited data. A lower grading, C3, may therefore be more relevant.

Table P11 and P12: The A1 and A2 confidence grades are unchanged from last year for AR08 and for Report Year +1 (2008-09). The Year +1 grade is inconsistent with the preceding P tables particularly where no increase is forecast and as a comparison with AR07 will indicate the forecasts are likely to be unreliable.

# Appendix A

# The Reporter's team

## APPENDIX A: THE REPORTER'S TEAM

### General

The Annual Return 2008 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.

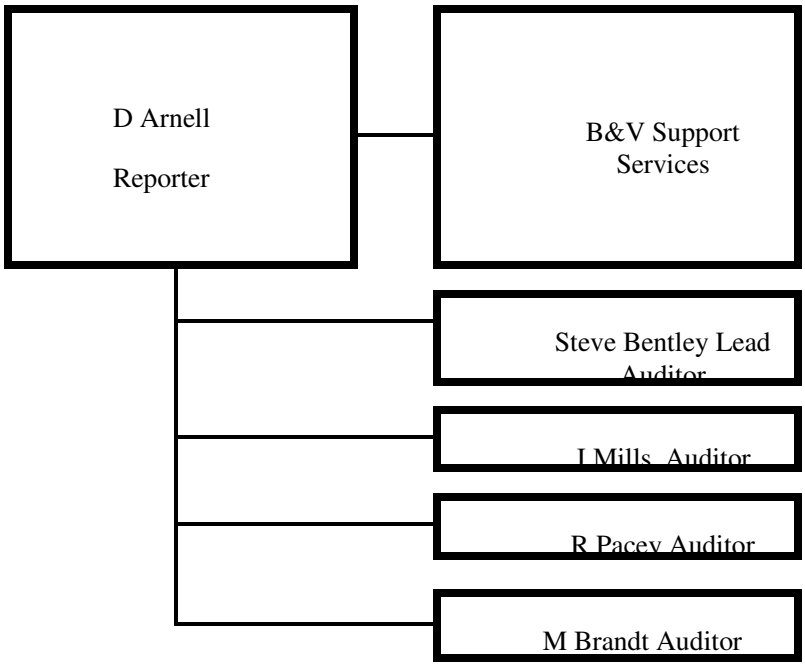


**Figure A.1 Structure of the Reporter's Team**

**Personnel used by the Reporter**

For this Submission the Reporter was assisted in his work by the following team:

Mr S Bentley, Lead Auditor: Mr Bentley is a consultant with Black & Veatch. Mr Bentley undertook reviews on measured supplies, the asset inventory and the capital programme

Mr J Mills, Auditor: Mr Mills is a Technical Director to Black & Veatch. Mr Mills reviewed work connected with sludge disposal and operating costs.

Mr R Pacey: Mr Pacey is a consultant with Black & Veatch. Mr Pacey 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.

Mr M Brandt: Mr Brandt is a Divisional Director with Black & Veatch and undertook work on population, flows, the water balance and the security of supply index.

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 |
|---|---|---|---|
| 28/04/08 | Fairmilehead Office | JS, IT, DA | DA/1: Tables B4 & B7 Customer Services |
| 29/04/08 | Fairmilehead Office | DM, IT, DA | DA/2 Table B4, telephone contacts |
| 29/04/08 | Fairmilehead Office | LD, DA | DA/3 Table B4 GMS payments |
| 8/05/08 | Castle House | PH, DA | DA/4: Table E1 Infrastructure depreciation charge |
| 9/05/08 | Castle House | KD, DP, GP, DA | DA/5: New obligations |
| 9/05/08 | Castle House | ME, GW, EM, DA | DA/6: Tables G5 & 6, Investment plan risk items |
| 9/05/08 | Castle House | PL, DC, DA | DA/7: DMA stock |
| 9/05/08 | Castle House | AMC, DA | DA/8: Non operational assets |
| 14/5/08 | Castle House | DMG, DA | DA/10: Employee numbers |
| 3/6/08 | Castle House | BO, DA | DA/11: Audit Committee |
| 3/6/08 | Castle House | PD, IP, DA | DA/12: Flooding confidence grade |
| 15/4/08 | Castle House | IP, KM & RAP | RP/19 Tables B3, B3a Sewage flooding incidents |
| 15/4/08 | Castle House | ST, AMcK & RAP | RP/20 Tables B3, B3a Flooding risk register |
| 16/4/08 | Castle House | MB, JR & RAP | RP/27 Table B8 Other service indicators - WTW Turbidity |
| 16/4/08 | Castle House | GH & RAP | RP/26 Table B8 Other service indicators - water mains bursts |
| 17/4/ 08 | Castle House | MW, DW, SB & RAP | RP/28 Table B8 Other service indicators - sewer collapses and failures, blockages |
| 21/4/08 | Castle House | AMcL, AC & RAP | RP/29 Table B8 Other service indicators - intermittent discharges |
| 22/4/08 | Castle House | MP, CL & RAP | RP/17 Table B2 Properties receiving pressure below reference level |
| 23/4/08 | Castle House | FN, MR, AJ, MP & RAP | RP/18 Table B2 Interruptions to Supply |
| 24/4/08 | Bullion House | GS, FN & RAP | RP/14a Table E6, E8, E9 Sewage Loads |
| 24/4/08 | Bullion House | GS, FN & RAP | RP/14 Tables A2, E11 Volume of Sewage |
| 24/4/08 | Bullion House | DJ, FN, GS & RAP | RP/57 Table E11 Asset Data M&G IT Assets |
| 25/4/08 | Bullion House | DM, GS & RAP | RP/13 Tables A2, B4 Septic tank and other tanker loads |
| 28/4/08 | Castle House | RS, GS & RAP | RP/10 Tables A1, P11 Trade Effluent |
| 28/4/08 | Castle House | RS, GS & RAP | RP/11 Tables A1, A2 Trade Effluent |
| 29/4/08 | Castle House | SW, MC & RAP | RP/31 STW Performance |
| 29/4/08 | Castle House | SB, ES & RAP | RP/30 Table B8 Sewerage Equipment Failures |
| 30/4/08 | Castle House | DM, GS & RAP | RP/15 Tables A2, H1, H5, P11, P12 Sludge |
| 07/5/08 | Fairmilehead | HC & RAP | RP/46 Tables E4, H1, H2, H3 Water assets - resources and treatment |
| 07/5/08 | Fairmilehead | MH, DS, AW & RAP | RP/34 Tables D5 Mains asset balance |

| Date | Location | Personnel | Subject |
|---|---|---|---|
| 07/5/08 | Fairmilehead | DS, AW & RAP | RP/37 Tables D6 Sewer balance (lines 1-3, 5-13) |
| 07/5/08 | Fairmilehead | DS, AW & RAP | RP/51a Tables E6, E7 Inventory bits |
| 08/5/08 | Juniper House | GS, ST & RAP | RP/48 Tables E6 Water assets - no and area of supply zones |
| 08/5/08 | Juniper House | FN, ST, HC & RAP | RP/49 Tables E6, H1, H2, H3 Water assets - distribution |
| 08/5/08 | Juniper House | FN, ST, HC & RAP | RP/52 Tables E6, E7, H1, H2, H5 Asset data - pumping stations. |
| 09/5/08 | Balmore Road | LB, MA, PH, KP, AD & RAP | RP/66 Tables G8 Application of infrastructure charge and SW contributions |
| 09/5/08 | Balmore Road | AD & RAP | RP/66 Tables G8 Review of development constraints |
| 13/5/08 | Castle House | JR, SA, ST & RAP | RP/51 Tables E7, H1, H4 Asset data - sewerage |
| 13/5/08 | Castle House | JR, SA, ST & RAP | RP/54 Tables E8, E9, C4 Wastewater treatment works |
| 13/5/08 | Castle House | GS & RAP | RP/53 Tables E8, H1, H5 Asset data - wastewater treatment |
| 14/5/08 | Bullion House | GS & RAP | RP/50 Tables E7 Drained area |
| 14/5/08 | Bullion House | GS & RAP | RP/55 Tables E10, H1, H6, D6 Sludge treatment and disposal |
| 28.4.08 | Watermark House | SEB, LC, PM, DL, AC | SEB1 – Drumelzier WTW Upgrade |
| 28.4.08 | Watermark House | SEB, LC, AF, JT, SC | SEB2 – Mugdock M1 |
| 28.4.08 | Watermark House | SEB, IM, SC | SEB3 – Barclye and Palnure WTWs |
| 28.4.08 | Watermark House | SEB, IM, SC | SEB4 – Newton Stewart WWTW & PS |
| 28.4.08 | Watermark House | SEB, PT | SEB5 – Oban SR |
| 29.4.08 | Watermark House | SEB, GS, JF, CC, SW, LC, SB | SEB6 – Dunfermline Eastern Expansion |
| 29.4.08 | Watermark House | SEB, SB, SW, CC, GS, LB, MP, JC | SEB7 – WOA000209 – Kettleton Mains Rehab. |
| 29.4.08 | Watermark House | SEB, SB, DMcG, SW, BN, JC, SH | SEB8 – UID Milton St. Airdrie |
| 29.4.08 | Watermark House | SEB, BM, SC | SEB9 – Drymen WWTW Extension |
| 30.4.08 | Leven House | SEB, IP | SEB10 – Mugdock Rehab Ph 2 |
| 30.4.08 | Leven House | SEB, JMcL, JC, AC, SM | SEB11 – Env. FTP Wastewater – Balvicar Isle of Seil |
| 30.4.08 | Leven House | SEB, AF, SB, HX, GW, IH | Elmvale Row, Springburn Flooding |
| 30.4.08 | Leven House | SEB, AF, SB, HX, JI, JMcMi | Mallaig WWTW Upgrade - Growth |
| 30.4.08 | Leven House | SEB, PF, SD, PL | Int. Flooding – Glasgow Morningside/Ruchazie Rd/Edinburgh Rd |
| 06.5.08 | Leven House | SEB, MMcG, JK, DMcC, GM, RS | Bowmore ST Facilities |
| 06.5.08 | Leven House | SEB, SC, BM, GM, JK | Dunoon Sewerage |
| 06.5.08 | Leven House | SEB, SC, NH, JL, JK | Beith CSOs Upgrading |

| Date | Location | Personnel | Subject |
|---|---|---|---|
| 06.5.08 | Leven House | SEB, SC, JK, BM, SF | Lochgilphead Front Green CSO |
| 07.5.08 | Torridon House | SEB, HMcP, AMcL, MG | Ballachulish, N Ballachulish and Glencoe WWTP Upgrade |
| 07.5.08 | Torridon House | SEB, DT | Env. FTP Wastewater – Loch Ewe E Bank |
| 07.5.08 | Torridon House | SEB, GL | Invergordon WWTW |
| 07.5.08 | Torridon House | SEB, IMcK, NB, JC | Cap. Mtce. Shapinsay Boreholes |
| 08.5.08 | Castle House | SEB, MH | G Tables - Overall |
| 08.5.08 | Castle House | SEB, RyP | H Tables - Valuations |
| 09.5.08 | Castle House | SEB, MP | G7, G9 Tables |
| 09.5.08 | Castle House | SEB, KD | G8, G9 Tables |
| 09.5.08 | Castle House | SEB, DP | G7, G8, G9 Tables |
| 19.5.08 | Castle House | SEB, IP | D7, D8 Tables |
| 19.5.08 | Castle House | SEB, AD | G Tables |
| 19.5.08 | Castle House | SEB, MH | G Tables |
| 20.5.08 | Castle House | SEB, MH | G Tables |
| 21.5.08 | Castle House | SEB, MH | G Tables |
| 22.5.08 | Castle House | SEB, RyP | H Tables - Comparisons |
| 22.5.08 | Castle House | SEB, RyP, HC | H Tables - Reconcilliations |
| 22.5.08 | Castle House | SEB, NB, MB, PD | G8 Table |
| 22.5.08 | Castle House | SEB, KM | Third Party Risk |
| 22.5.08 | Castle House | SEB, TH, EM | Table G - Inflation |
| 22.5.08 | Castle House | SEB, RB | G9 Table |
| 23.5.08 | Castle House | SEB, RS, GMcL | G4, G8 Tables |
| 23.5.08 | Castle House | SEB, MM, SC, EM | G Tables – Capital Drivers |
| 23.5.08 | Castle House | SEB, SC, MS, EM | Table G7 |
| 23.5.08 | Castle House | SEB, AmcK, DW | Table G9 |
| 23.5.08 | Castle House | SEB, PH, JMcD, ST | G Tables – Reconcilliation With Annual Accounts |
| 3/12/07 | Castle House, Dunfermline | NA, PD, B McG<br>DA, JBM, PM | Annual Return planning meeting |
| 22/04/08 | Watermark Ho., Livingston | JBM | DAP Audit Trails |
| 28/04/08 | Fairmilehead, Edinburgh | MS, EC, JBM | ABM Audit, Tweed Region |
| 29/04/08 | Henderson Drive, Inverness | DF, GY, JBM | PPP Audits Table E3 |
| 29/04/08 | Henderson Drive, Inverness | DF, GY, JBM | PPP Audits Table E3a |
| 01/05/08 | Kingshill, Aberdeen | SC, LC, EF, JBM | ABM Audit, Don Region |
| 22/05/08 | Castle House | ST, DF,JBM | ABM Audit, Process and final reporting |
| 16/04/08 | Juniper House | RS, EH2, IC, LM, MB | MB/1 Table B |
| 22-23/04/08 | Fairmilehead | LB, CO, SH, CC, MB | MB/2 Table A, Table P |
| 29/04/08 | Fairmilehead | RM, JR, CC2, RD, PH, MB | MB/3 Water Balance methodology and calculation |
| 29/04/08 | Fairmilehead | WB, DC, MB | MB/4 Leakage for Water Balance |

| Date | Location | Personnel | Subject |
|---|---|---|---|
| 30/04/08 | Fairmilehead | JR, EH2, MB | MB/5 Water Balance Tables |

**Reporter's team**

| | | | |
|---|---|---|---|
| DA | David Arnell, Reporter | RP | Roger Pacey |
| JM | John Mills | MB | Malcolm Brandt |
| SB | Steve Bentley | | |

**Company and Supplier staff**

| | | | |
|---|---|---|---|
| BO | Belinda Oldfield | AM | Alan McLean |
| SA | Stephen Armstrong | DM | David Mentiplay |
| MB | Michael Baird | FN | Fraser Nicholson |
| LB | Laura Birch | CO | Colin O'Neill |
| SB | Stuart Byfield | IP | Iain Palmer |
| HC | Helen Cameron | MP | Mark Petrie |
| MC | Mark Campbell | KP | Keith Phillips |
| AC | Allan Coulter | MR | Martin Reilly |
| AD | Alistair Davidson | JR | John Robertson |
| PH | Peter Haddow | RS | Richard Scoble |
| GH | Graeme Hamilton | DS | Devanathan Sethuraman (Farrer) |
| MH | Margaret Harding | ES | Eddie Sharp |
| GH | Greig Hay | GS | Gordon Stenhouse |
| AJ | Aileen Jardine | ST | Steven Templeton |
| DJ | David Johnson | AW | Andy Walkley (Farrer) |
| CL | Craig Low | MW | Martin Walton |
| KM | Kevin Mair | SW | Steven Waugh |
| AM | Alistair McKenzie | DW | David Winter |
| JS | Jacqueline Sutherland | IT | Ian Turpie |
| DM | David Macdonald | LD | Lorraine Dutch |
| KD | Kieran Downey | DP | Dave Petrie |
| GP | George Ponton | GW | Gavin Ward |
| EM | Ewan Matteys | DC | Douglas Cassells |
| PC | Patrick Lynn | AMC | Alan McLean |
| MA | Miriam Ali | IP | Ian Palmer |
| PD | Peter Douglas | JMcD | Jill McDonald |
| ST | Scott Turkington | SB | Steve Boyes |
| RyP | Ryan Prangle – Data Management | HX | Helena Xanthopoulis |
| AF | Alan Farr | JI | Jackie Ingram |
| JT | Jim Tracey | JMcMi | Jim McMillan |
| GL | Glyn Lloyd | MP | Mark Petrie |
| LC | Leslie Cameron | EH | Eric Hutchinson |
| EM | Ewen Matthey | AC | Alex Cranston |
| EH | Ewen Harrison | AF | Alan Falconer |
| DL | David Lavery | SC | Stefan Corbett |
| IM | Ian Morton | PT | Phillip Todd |
| GS | Ged Shotton | JF | John Fyldes |
| CC | Charles Cameron | SW | Stephen Watson |
| LC | Lewis Chapman | GS | Gillian Sneddon |
| LB | Les Bell | MP | Mark Pearson |
| JC | John Carty | DMcG | Duncan Mc Guinity |
| SW | Stephen Watson | BN | Brian Nichol |
| SH | Stephen Horne | BM | Brian Mitchell |
| IP | Ian Piggott | PM | Patricia Melly |

| | |
|---|---|
| JMcL | John McLeod |
| SM | Stuart Milne |
| GW | Graham Wood |
| PF | Peter Faulkes |
| MMcG | Mark McGlaughlin |
| DMcC | Debbie McCormick |
| RS | Rennie Stone |
| BM | Brian Martins – Galliford Try |
| SF | Suzanne Foo |
| AMcL | Alan McLeod |
| DT | Dave Turner |
| IMcK | Ian McKay |
| IP | Ishbel Parry |
| NB | Norrie Butter |
| PD | Paul Davidson |
| JH | Tom Hedley |
| RS | Robert Stewart |
| MM | Mike Mahon |
| AMcK | Alastair McKenzie |
| RS | Robert Stewart |
| IC | Iain Cambell |
| EH2 | Elaine Hutchison |
| LM | Lindsey McMillan |
| LB | Laura Birch |
| CO | Colin O'Neill |
| SH, | Stuart Henderson |
| CC | Colin Collier |
| JCl | Jim Clarke |
| AF | Alan Farr |
| IH | Ian Heggoty |
| PL | Paul Leithead - Carrillion |
| JK | Jim Kane |
| GM | Garvey Murray |
| NH | Nick Hailey |
| JL | John Leslie |
| HMcP | Hugh McPherson |
| MG | Murray Gordon |
| GL | Glyn Lloyd |
| NB | Neil Brennan |
| HC | Helen Cameron |
| MB | Michael Brennan |
| KM | Kieran Morgan |
| RB | Rod Balfour |
| GMcL | Gordon McLee |
| MS | Murray Stewart |
| DW | David Winter |
| RM | Raymond Miller |
| JR | John Robinson, Contractor (RPS) |
| CC2 | Conner Crawford, Contractor (Jacobs) |
| RD | Richard Dixon, Contractor |
| PH | Patrick Heaton, Contractor |
| WB | Bill Brydon |
| DC | Douglas Cassels |

# 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 2008 only is shown in the table below:

| Reporter/Team Member | Time spent (Hours) |
|---|---|
| D Arnell | 139 |
| S Bentley | 195.5 |
| J Mills | 41.5 |
| R Pacey | 281.5 |
| M Brandt | 92.5 |
| Others | 22.0 |
| Total | 772 |

The figures quoted above relate to actual time expended to the 4th July 2008. 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. We had numerous discussions on points of detail which are covered in our main report sections.

### Table A1 & A2

General

The overall methodology and calculation developed for producing the water balance which feeds into tables A1, A2 E6 and the P tables is a thorough well structured process that generally delivers consistency across the tables. The relationships between lines in the tables are readily auditable. However we noted some discrepancies in the final tables, that may reflect the fact that different teams are responsible for individual table lines and that common data required by the different teams was supplied at different times before the base data had been finalized.

Table A1

When reviewing trade effluent we noted that the trade effluent systems were complex. During audit it was noted that some of the data extraction queries were shown to be producing incorrect data.

Table A2

Water Taken Legally Unbilled includes 7,800 animal trough connections billed as a fixed charge. We questioned whether they should be included instead in the Unmeasured Non-household category as well as the metering programme. Poor maintenance of animal trough plumbing can result in significant unrecorded water loss.

Sample surveys of 1,200 animal troughs concluded that the there were in the order of 3.5 unrecorded animal troughs per billed troughs. We noted that although the estimated usage in the water balance is based on an assumed 29,000 troughs, the number of trough connections is not included in the reported number of unmeasured non-household connections and represents a loss of revenue and an underestimate of the underground supply pipe leakage.

When reviewing information on septic tank and other tanker loads we noted that while all the data is derived from the computer based tanker load control systems there is a lot of manual extraction necessary. We noted the possibility of error and suggest that as part of its data improvement project Scottish Water reviews its current methods of data extraction.

### Table B2

When reviewing the data on interruptions we noted that site operatives still tended to use rounded times, opening the possibility of skewing the data. We have noted that this happens at other companies and acknowledge that educating the workforce to enter exact times is very

difficult. Nevertheless we suggest that Scottish Water continually reinforces the need to enter times accurately.

**Tables B3 and B3a**

When returning sewer flooding information some data remained missing during the reporting year. Scottish Water therefore used an uplift system to force figures to match the actual number of complaints recorded in Promise. Unresolved cases at the year ends are thereby absorbed into those numbers. We asked SW what the value of uplifting numbers was, especially now that unresolved cases are fewer than in previous years. Scottish Water informed us were told that the uplift system in this and other subjects is to be dropped. We accepted that the situation was much improved from the previous year.

During our audit we noted that Scottish Water had established a robust system for recording property flooding cases more frequent than 1 in 10 years. We were concerned that a similar effort was needed to achieve similar quality with 1 in 20 years property flooding.

We further noted that data quality for external sewer flooding was not of the same quality as for the internal sewer flooding and the same comment applies.

**Tables B4 & B7**

We had few concerns with the information in tables B4 and B7 this year. Scottish Water has made a number of improvements to its processes this year which are pleasing.

We were initially concerned that the newly formed GSS payment team used spreadsheets to record and monitor its work. However, we believe that the small team and relatively few payments does allow their use to be acceptable. We believe that the records are properly kept.

We noted that telephone contacts that are dealt with at the time are not recorded on the Peoplesoft billing system. This is inconsistent with Promise, where all calls are logged.

**Table B8**

When reviewing water mains bursts we noted that the WAMS system fails to encourage site staff to amend the resolution codes to the outcome as exercised in the ground. Free text boxes are provided but the contents can sometimes be ambiguous to later readers and cleansing the data can be time consuming. We suggest that Scottish Water reviews the system to see how it can be improved.

When reviewing the data on sewer collapses we noted again that the WAMS system fails to encourage site staff to amend the resolution codes to the outcome as exercised in the ground. We also noted that the site squads are not required to relate the problem to the exact asset. The job OS grid reference for the customer's address recorded in Promise can be in error by up to 20 metres in relation to the asset, potentially corrupting asset quality information.

**Table B9**

There is uncertainty in a number of the components used to calculate the SOSI index including outage allowance, treatment works and raw water main losses that lead to uncertainty in the deficits in some areas and hence the score itself. This can be material where deficits are small. Based on the contractor's report and selective works visits, revised site specific figures are used where possible, otherwise generic figures used for previous returns have been used. Recognising that there may be insufficient new statistical data to derive revised generic values, it is a weakness that site specific factors have not been produced for the larger zones, works or components that are significant where zones are marginal.

**Table D6**

When reviewing the information on the sewer balance we noted that the estimate of missing inventory sewerage (1000Km) is allowed to stand each year. We would expect a gradual reduction as discoveries are made. The estimate of lateral sewerage (nearly 16000Km) is recalculated each year based on dwelling types leading to a moving estimate of assets which are in fact intrinsically stable.

**Tables E1 to E3a**

In Table E1 we challenged Scottish Water over its estimate of Infrastructure Depreciation Charge, noting that it was less than current infrastructure renewals expenditure. Scottish Water explained that the IDC was not calculated in the same way as in England and Wales and had been set in a consistent manner to the SR06 final determination. It had also been signed off by the financial auditors. This was noted.

We challenged the allocation of power bills and other costs incurred at a single asset between service areas. We believe that this should be updated for future returns to ensure that recent data is used based on assessments of individual assets and current practice.

**Table E4**

We note that Ellipse fails to provide data easily for linked assets leading to manual data changes and separate spreadsheets. We suggest that Scottish Water reviews whether the current system can be improved.

**Tables E6 & 7**

For pumping stations we noted that data gap filling is required because Ellipse isn't fully populated. We suggest that Scottish Water considers how the data gaps can be filled.

We believe that for water supply the calculation of average pumping head has improved. For the sewerage average pumping head we challenged Scottish Water in a number of areas of its calculation. Scottish Water reviewed its calculations and produced amended figures.

**Table E11**

During audit we challenged the Company over its allocation of staff to capital projects, noting that some customer services and scientific services staff had been re-allocated. Scottish Water was able to demonstrate that the allocation was reasonable.

**G tables**

We noted that there continues to be significant issues in some Q&S2 completion projects, mainly due to third party influences 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. We reviewed the Q&S3 third 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, we noted that it is likely that some third party risks will materialise causing delay and cost escalation to a small number of Q&S3 projects.

In the initial version of the G tables seen at the time of audit it was not possible to reconcile expenditure between the detailed project data in Tables G5 and G6 with the summary data in Tables G1 – G4b. Following further work by Scottish Water a revised version of the tables was produced which was fully reconciled on the basis of expenditure.

We noted that Scottish Water has made no programme level adjustment to the individual project figures in either the CIR or Table G6. However during discussion we were informed that the programme contains a risk holding line with expenditure of £55.200m (net) for AR08, with a negative figure of -£31.719m in 2008/9, to allow for slippage in projects in that year which has not been identified on a project-specific basis. .

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.

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 project manager's current view of the project was materially different from that reported in CIMS and captured at year-end. However it was noted that:

- Where projects are being run by Scottish Water Solutions, the project manager does not always have a clear picture of total project cost, as opposed to construction cost and SWS cost.

- In some cases the capital programme and Tables G5 and G6 have not been updated with the Engineer's latest estimate of outturn cost, even where this has changed significantly.

- Opex reductions due to works abandonments do not always appear to have been taken into account in assessing Opex impact.

**H tables**

Inventory

Generally major site assets had been reasonably recorded but during our site visits we noted some errors including some non-infrastructure items being omitted from the database.

For a small sample of sites we also compared survey data with the data held in Ellipse to check that these had been accurately transferred. Significant differences were noted. However, it was difficult to draw conclusions from this review, since Ellipse is updated from a variety of sources in addition to the site surveys. We recommend that SW considers how the audit trail is recorded for assets and asset data in Ellipse, to improve confidence in their reliability. We accept that the collection of an accurate asset inventory is time consuming and difficult. During such a process some errors are likely. We remain unsure of the impact of the uncertainty around our findings on the resulting asset valuation.

We noted that the depths of many tanks remained unrecorded and assumptions as to depth had

to be made. These assumptions are likely to be reasonable but a lack of actual data does lead to some additional uncertainty in the valuations.

We believe that the in particular water non-infrastructure Ellipse data base needs to be selectively reviewed by the asset planners and operations.

Valuation

During our audits of non-infrastructure valuations we noted that some cost graphs had been misapplied leading to significant overvaluations in some areas. When this was pointed out to SW the error was accepted and SW revised the valuations concerned.

SW accidentally omitted to include the Gross MEAV for sewage and sludge pumping mains laid in grassland. The estimated valuation is £51M.

For infrastructure assets the surface type was chosen from the relevant GIS field. The quality of this information in the GIS has not been checked.

Gross valuations for buildings have been carried forward from previous years with COPI updating, being last assessed in 2004 for the previous Business Plan. As for previous years we note that similar costs are used for properties that are obviously different in size. We suggest that a formal valuation is carried out on these assets before the 2nd draft business plan.

**P tables**

See comment above on tables A1, A2 and E6.