WATER INDUSTRY COMMISSION for SCOTLAND

Reporter Services

Annual Return 2009-10
Reporter's Report

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SCOTTISH WATER'S ANNUAL RETURN 2009-10 REPORTER'S REPORT

CONTENTS

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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 its 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 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 2009-10 (AR10).

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 2010 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

Scottish Water has not changed its process this year for preparing the Annual Return. Accordingly, we repeat our comments for last year.

Day to day business in Scottish Water is controlled by the Executive Leadership 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, Customer Service Delivery and Asset Management Directors, and the General Manager Regulation. Commencing in January, the Regulatory Management Group sets out the management requirements of the Annual Return.

The Director of Finance and Regulation is also a member of the Board and 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.

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, last year renamed as Governance, Information and Value (GIV), 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, which has only changed in one respect this year, 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 report, a summary of last year's Reporter's recommendations and suggestions and last year's queries from WIC together with Scottish Water's 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 GIV 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" who is a member of GIV and each line has a "line owner" who comes from the relevant operating department. Each table also has a technical reviewer, who again is generally a member of GIV, apart from the specialisations of leakage and finance where the relevant manager takes on this responsibility. Responsibility is therefore clearly defined. Reviewers are senior people with a good knowledge of the business but may not have a deep technical knowledge of the relevant item being reviewed. However, we believe that often an enquiring mind and the willingness to apply "sense checks" is worth more than detailed technical knowledge. We also note that Scottish Water has recognized when specialist knowledge is essential and has appointed reviewers accordingly.
- 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 GIV group produces the tabular information and a draft narrative and undertakes quality assurance. The GIV 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 amended by the Regulation Department are sent back to GIV for final agreement.
- Starting last year, line owners, table owners and managers are all required to formally sign off each item of work. This is done by means of a "sign off" sheet that is later filed.
- Starting this year, at a formal meeting, table owners present their information to the Finance & Regulation Director and the General Manager Regulation. Any points of issue are discussed. This new initiative allows the Finance and Regulation Director to expose, discuss and thoroughly understand important points. He can then brief the Board as considered necessary. We believe that this is an important improvement to Scottish Water's process.
- Final narratives are approved by the four executive directors responsible for the information.

The overall governance of the Annual Return process is managed by a hierarchy of "groups":

1. The Regulatory Management Group meets monthly throughout the year to discuss regulatory matters and reports directly to the Business Management Team. The group is chaired by the General Manager Regulation.

2. The production of the Annual Return itself is managed by the "AR Governance Group" which meets weekly during the production process.

3. The process for producing the Annual Return is overseen by the "AR Steering Group" chaired by the General Manager Regulation.

We believe that this means that the Company does have an effective process for completing its Annual Return. In particular we believe that the new GIV 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. While the use of corporate databases grows each year, some analysis is still completed using spreadsheets developed for the purpose by individual line and table owners. Random checks are carried out on spreadsheets. Such checks can allow some errors through but total checks would be very onerous, particularly given the time pressures for the production of the Return.

We believe that requiring line owners to sign off their work imposes a useful discipline.

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.

We conclude that the process this year went relatively smoothly apart from two areas where Scottish Water changed its approach following our audit. This required us to re-audit revised figures very late in our work, adding to time pressures.

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 Annual Return and also consistent with the information arising out of our audits.

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

Key outputs and service delivery

Scottish Water reports that it's OPA score has increased to 291, an increase of 15.5% over last year's 252. Scottish Water also reports that, as for last year, it has lost a potential 9 points following the removal of its non-household billing function. We have audited this figure and give detailed comments in our specific report on the OPA. This significant improvement is of credit to Scottish Water. The main driver for the improvement is a very large improvement in the compliance of Scottish Water's sewage treatment works. 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 such that it can drive further improvements.

During the report year Scottish Water has continued to improve its data capture from its operating staff. We have noted the continued efforts that are being made to ensure that data capture is both timely and accurate. We believe that through its GIV 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 significant progress made by Scottish Water in improving its leakage control. For the reporting year Scottish Water now has all the infrastructure in place to undertake effective leakage control and to properly understand its water balance. Scottish Water continues to develop its ELL calculations. We no longer audit this work but believe that in the next year or so Scottish Water will have a robust ELL to allow accurate water balances to be made for its many water resource zones.

Since the Wholesale/Retail split Scottish Water no longer has instant access to some data that it needs to effectively run its business. Despite furthering its understanding of why non-household consumption appears to have changed, some uncertainty remains. We understand that uncertainty around some information provided by the CMA is unlikely to be resolved until towards the end of the 2010/2011 reporting year. We urge both Scottish Water and the CMA to resolve these issues as rapidly as possible.

This year Scottish Water again exceeded its leakage target by a significant amount. The rapidity with which Scottish Water is reducing its leakage is to its credit.

While leakage was measured for the whole year with much improved accuracy some uncertainty in the water balance remains, largely due to doubt around non-household consumption (see above). We believe that Scottish Water has been proactive in this area. We note that the water balance, as measured by the Security of Supply Index (SOSI), will be included in the OPA next year and a swift resolution to the present uncertainty is needed. We note that Scottish Water has taken some steps to better understand its minor components this year (water taken legally, water taken illegally and distribution system operational use). Whilst noting the difficulty of measuring consumption in these areas we recommend that Scottish Water continues its investigations.

Scottish Water reports that properties subject to interruptions have increased this year. It mentions 3 significant incidents in this regard. We also note that bursts on its mains increased for the 2nd year running. Given that there have been two severe winters this is not surprising. It is likely that if the coming winter is more benign the figures will drop, but it is important that burst data is monitored closely to check that inclement weather is the true cause. It is possible that leakage activity on the system coupled with better reporting is a contributory factor.

We note that sewer collapses have also increased for the second year running. We believe that this trend should be monitored and analysed closely to ensure that deterioration of the system is controlled.

We note that the standard of Scottish Water's customer contact indicators remain high but also note that there was a slight reduction in calls answered within 30 seconds. This was due to the unprecedented levels of calls in the cold weather in January, when, for the first time, the capacity of Scottish Water's telephone lines was exceeded. We believe that Scottish Water is to be congratulated on its management of the event, which limited the negative impact on the service it provided its customers. We believe that Scottish Water's level of service will return to those of previous years in the current year.

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. We note that in the SR10 period Scottish Water proposes to undertake significant programmes of small water treatment works improvements and water mains rehabilitation that will allow it to improve on its existing levels of compliance.

The Company had 12 failing wastewater treatment works at the end of the report year. Last year there were 24 failing works with the prior year's total being 30. This year's result is therefore pleasing, particularly as the Company has worked hard in this area and the improving trend has continued. 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 99.88% complete on the Q&S2 programme (99.55% last year). The Q&S3a programme is substantially complete in many areas with total expenditure at the end of the year estimated at 91% of the total. This leaves a projected overhang into the SR10 period of £190M. We note that the estimate of future spend includes a significant proportion of risk and other contingency items. We conclude that there is still significant uncertainty over the outturn cost of the remainder of the programme.

2.6 Key supporting information

Water resources, supply demand balance and Security of Supply Index

Scottish Water reports its security of supply index for the fourth time this year. The results show that only 75% of the population are in zones with a surplus (70% last year). In previous years Scottish Water has stated 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 continue to believe that Scottish Water's view is sensible.

While Scottish Water continues to improve its SOSI calculation, as a result of our audit we continue to note that one or two parameters used in the supply demand balance calculation remain uncertain. In particular Scottish Water needs to continue to work as rapidly as possible towards a robust Long Run Economic Level of leakage, in order to help inform it as to the most efficient way of closing its deficits.

Asset revaluation

In its narrative Scottish Water gives details of its revised asset valuation, which is little changed from last year. While the majority of assets are now based on stable information we still see significant changes at some sites that are not as a result of capital works. Whilst accepting the very large numbers of Scottish Water's non-infrastructure assets we continue to recommend that Scottish Water continues to update its data with a review to having robust information at all its sites by the end of the SR10 period. We note that the valuation of Scottish Water's sewer laterals are based on a limited sample and believe that the valuation of these assets is very uncertain.

We note that currently Scottish Water is updating its cost curves used in the calculation of its MEAV. These have not been used in this valuation but we understand that Scottish Water intends to use the updated curves next year. As cost curves are updated it is possible that the asset valuation will change.

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.

We note that Scottish Water reduced its carbon footprint by reducing leakage and has included investment in 15GWh of hydro power in its SR10 programme. We concur with Scottish Water's view that investment in such technologies will be necessary if it is to make significant improvements in its current energy balance.

Information improvements

Scottish Water states that it continues to improve its information systems, mentioning specifically a new low pressure information system as well as a new capital programme management system. We have also noted the continued implementation of handheld information capture systems in significant parts of Scottish Water's operations. Over the time we have been reporting on Scottish Water's activities we have been happy to see the very significant improvements in its information capture and analysis. Based on our wider work we see that effective data capture and analysis is key to effective management. Current efforts in the industry are focussed on providing the tools for effective asset management and controlling levels of service and we recommend that Scottish Water continues its efforts in these areas.

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. For this return the P tables were not audited, however the P tables are referred to where line items were derived from P table data.

In the main the methodology for compiling connection and billed property data for Table A1 and populations for Table A2 and for forecasting 'Year +1' is similar to methods used in previous annual returns. The tables have been compiled from the most recently available data and data sources (2008, 2009 and 2010) have been used to compile the returns and forecasts including WIC4 (September 2009) and Central Market Agency (CMA) derived data produced from the migrated Business Stream HiAffinity database into the CMA's 'Central Systems' in 2009.

For 2009/10 Scottish Water has generally used methodologies and processes developed for previous returns and compiled the reported numbers of connected and billed properties and populations using a thorough and auditable approach. There has been increased acceptance of CMA source data manipulated only to generate the table line figure and less interpretation or extrapolation from multiple sources than in previous years.

Confidence grades for data derived from the CMA (and LPs) are 'B' to reflect the source of the data.

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 the latest published sources.

- The allocation of unmeasured domestic properties relies in part on the WIC4 returns from councils and growth rates 07 to 17 from C-tax base reports. The overall methodology changes introduced for AR08 have been followed for this return.

- Measured and unmeasured non-household property and consumption information was derived from the CMA supplied data following the migration of the Business Stream's billing system, at the beginning of 2008.

- In the AR09 report we discussed discrepancies in the numbers of unmeasured non-household billing records derived from the CMA migrated data. The main causes of concern related to void numbers and unmetered animal troughs. There has not been time to resolve all of the anomalies identified during the last year. Although about 60% of the anomalies have been investigated, corrections to the billing records are unlikely to be completed before October 2010.

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

- The numbers reported are the numbers of consented discharge points. Many of these properties are billed as measured or non-measured non-household supplies because it is not considered cost effective to carry out the sampling required to apply trade effluent charges or in some cases it is not required. More than one trade effluent customer can occupy a billed property in a year.

- Trade effluent loads include loads discharged to PPP treatment works.

Audits of sources of data, methodologies and cross checks between table lines did not highlight any significant differences; minor anomalies and differences were discussed during the audit and changes applied during the audit. There were no significant outstanding anomalies on completion of the audit.

4.2 Table A1: Base Information – Connected and Billed Properties

Commentary by REPORTER

Introduction

Population and property estimates and outputs to tables are derived from manipulation of data obtained from third parties. Scottish Water has used a consistent methodology for deriving population and household data and forecasting for both AR09 and SR10. The approach uses data from:

- GROS 2006 Household Projections Revised (published November 2009)
- GROS 2006 Private Household Projections (2006 – 2031) Revised (published November 2009)
- GROS 2006 Projected Population of Scotland
- GROS 2008 Projected Population of Scotland
- WIC4 Billing and Household data (September 08 and September 09)
- Experian Water Demand Forecasts (February 2008)
- Experian Water Demand Forecasts - Autumn 2008 (26 November 2008).
- 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's 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 the Water Resource Zone.

The domestic property data have been abstracted direct from WIC4 as at 30 September 2009 using the changes in discounts first reported in AR08. Therefore minimal manipulation has been required. However the data from one Unitary Council, Mid Lothian, did not include the numbers for the New Reduction Scheme. Scottish Water therefore used the WIC4 2008 reported numbers to apportion the new reductions for September 2009. As for the previous return, Full charge, second homes and Long Term Empty are all included under the No reduction category.

The methodology and sample calculations were audited.

Non-household property numbers data were abstracted from the CMA dataset provided to Scottish Water in March 2010 for the mid year September 2009. The Year +1 non-household forecasts are based on the growth figures (premises numbers and volumes) quoted in the Experian report (November 2008); 0.7% per annum.

Following business separation and changes in source data there were significant differences in the reported numbers between the two previous annual returns. The variations were primarily associated with 'Vacant' properties and estimates of unbilled unmetered field troughs. Scottish Water, in coordination with the CMA and the LPs, has started to investigate some of the numerous data anomalies in the CMA data. There is therefore less uncertainty in the numbers compiled for this report mainly around 'Vacant' properties, although there is concern about the time required to revise the billing data records. Details of the vacant and field trough analyses are discussed below.

The approach for this annual return is consistent with the approach used for SR10 business planning and previous annual returns. We confirmed that the same household projections have been used for drafts of the Tables A and B.

Key points

Unmeasured households

- The method used to compile the 2010 return is similar to that used in the 2009 return except that water growth for Year +1 is the SR10 Final Determination growth factored to a Total dwelling figure using the 2009 Water Dwellings to Total Dwellings ratio. A similar approach has been used to derive sewage property numbers.

- The number of 'void' properties is taken from the C-tax base where they are described as unoccupied exemptions. "Other exemptions" in the C-tax base are reported in the exempt line. Second homes and long term empty properties are identified separately, the former being reported within "unmeasured household billed properties".

- As commented above, Scottish Water has been able to collate the 2009 WIC4 data into the appropriate reporting line item. Total dwellings have been factored for Year +1 based on the proportional increase in Total Household.

- The simplified benefit discount scheme with Full (25%) or Partial (up to 25%) discounts only has been used for this return.

- Unmeasured exempt households have reduced by 1,149 from 60,537 in 2008/09 to 59,388 for this return. Unmeasured 'void' properties have also reduced 4,741 from 53,637 in 2008/09 to 48,896 for this return (reported in the P tables).

Measured domestic and non-household properties

- Measured domestic property and consumption data are taken from the Scottish Water Ellipse system used for the revenue meter asset inventory. This is as for previous years.

- For this annual return, measured and unmeasured non-household property data is abstracted directly from the CMA 'Central Systems' database for the mid-year (September 2009) and the actual metered volumes are used to derive the annual average volumes.

- There has been a net reduction of 8,981 connections in water "Non-household billed properties" and a corresponding increase in non-household 'void' properties of 3,370. Studies commenced during the year to investigate the large discrepancies between non-household properties between AR08 and AR09. Detailed description of the reasons for some of the conclusions from the studies and changes in numbers between years is given in the commentary below. The apparent increases in numbers were not reflected in the non-household foul sewage numbers with a net reduction of 3,030.

- Unmetered non-household customers are currently 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. Although the non-household customer metering programme is substantially complete, there have been no optant switches in AR09, essentially customers are waiting for a free meter.

Audit Process

During the audit we reviewed:

- The methodology for estimating connected and billed properties
- Original and supplementary 3rd party datasets
- The copies of spreadsheets used to calculate populations, households.
- The consistency of data with that reported in P and A tables and then E tables.

We checked sample lines in the tables to confirm the audit trail back to the base data.

The audit was carried out by interviewing members of Scottish Water's staff responsible for the compilation of the tables and with direct, unrestricted access to data held on Scottish Water information systems.

General observations on the CMA data

Following the opening of the water market in Scotland for non-household customers on 1 April 2008, all wholesale charges due to Scottish Water from Licensed Providers (LPs) have been calculated by the Central Market Agency (CMA). In order to support this activity the CMA keeps a record in the 'Central Systems' of all non-household supply points in Scotland along with all charging details (but the system has simplified how trade effluent charges are calculated). Scottish Water owns data items relating to assets and is responsible for maintaining them via data flows to the CMA. LP owned data items include meter readings and customer attributes (such as vacancy status, exemption, rateable value and Supply Point address) are managed at the CMA by a similar mechanism.

There are four stakeholders interested in the water supply and sewerage services to a supply/discharge point; the customer, an LP, the CMA and Scottish Water. Each has data which is protected for legitimate commercial reasons by the CMA which alone holds all information. A customer is identified by supply point identifier (SPID or in trade effluent DPID) and a supply point may have multiple connections to the water distribution and sewerage systems and in each case there may be a domestic element.

In principle, the customer is served by an LP but Scottish Water owns and maintains consumer water meters and is responsible for meter connections and disconnections (including the initial and final reads respectively), trade effluent consenting and policing. Scottish Water does not own the trade effluent discharge meters. LPs are responsible for holding a contract with a customer, reading meters within prescribed time frames and invoicing customers. LPs pass service data to the CMA for storage on its Central Systems. The CMA is responsible for compiling the data and monthly and reconciliation submissions to Scottish Water to calculate bulk wholesale service charges for the LPs. The CMA is responsible for holding the data and all data shortfalls must be passed either way back through the CMA.

The settlement reports are produced by the CMA from the Central Systems in accordance with the Market Code Subsidiary Documents (CSDs) which set out the processes and charging rules which are used to calculate wholesale charges at each Supply Point. Since the AR09 report, the CMA has changed the methodology for dealing with two measured volume record issues, meter rollover and estimating consumption since the last meter reading. For the former, a process has been established for monthly exceptions reports to identify meter roll-overs and to calculate consumption manually. A more robust and consistent automatic calculation is now used for the latter that uses historic consumption data until there are two meter readings and thereafter the actual consumption to the latest reading extrapolated to the year end. For AR10 Scottish Water has accepted the CMA consumption data and no longer calculates consumption by meter from the raw meter readings.

The settlement reports contain details of wholesale charge calculations per Service Element. A Service Element is any type of water or sewerage service which is associated with a Supply Point and which generates wholesale charges such as water meters, sewerage meters (these are virtual rather than physical meters and are used for charging purposes only), field taps, troughs, roads drainage and property drainage.

The most recent available settlement report that was available at 31 March 2010 for each month in the 2009/10 financial year has been used including trade effluent. (In AR09 Scottish Water, because of data issues, used the volumes reported in the 2DBP, in conjunction with analytical data from 2008, to calculate load data for 09/10). The relevant reports used for each month for 2009/10 are:

2009/10	April	May	June	July	August	September	October	November	December	January	February	March
Settlement Report	R3	R3	R3	R2	R2	R2	R2	R2	R2	R1	R1	P1

Legend: *P1 – Provisional Run (Month X – 16 business days)*
R1 – 1st Reconciliation (Month X + 2 business days)
R2 – 2nd Reconciliation (Month X + 2 months)
R3 – 3rd Reconciliation (Month X + 8 months)

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 local council tax. 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.

Some properties have non-standard tariffs under special retail agreements with the LP. The terms of the agreements are not visible to Scottish Water. There are also some customers that have special wholesale agreements based on agreements that predate market opening (Schedule 3 agreements). These are reported in the P tables.

Trade effluent data is more complex because of Scottish Water's need to police discharge consents and protect WwTWs. A trade effluent consent is set up in agreement with the trader as to volume, effluent quality discharge, seasonal and other conditions (e.g. pea processors or fish processors may need particular arrangements). A copy of the availability parameters (volume, settled Biochemical Oxygen Demand load and Total Suspended Solids loads) in the consent is given to the CMA for wholesale charging purposes. Scottish Water continues contact with the trader through regular, random or composite quality sampling and, possibly, effluent meter reading. An effluent meter is supplied and owned by a trader although Scottish Water may assess its performance.

In operation, the LP reads any meters, water supply and effluent, works out the numbers of days of discharge and passes the data through the CMA. The CMA passes the aggregated data onto Scottish Water so that it can invoice the wholesale charges to appropriate LPs.

For the AR09 Reporter's report we identified a number of issues with the CMA data and interface processes between Scottish Water and the LPs that could impact the reported numbers. The following commentary details progress on some of the more significant issues: by joint working groups during the year.

Process issues:

- There is an "effective date" when a new connection (SPID/DPID) is made from which charging should start –'enter charge'. Scottish Water is responsible for making the connection and for supplying the data to the CMA. On receipt of the data from the CMA, the LP should then complete a sequence of actions in a specific order. If the sequence is not followed the SPID is not put into trade on the "effective date", but the service is live. As of the end of February 2010 there are 2082 new and partial supply points that have not entered charge, some of which may be duplicate records. Of these new SPIDs 623 are over 6 months old, with a combined potential consumption of 2.9 Ml/d based on average usage by metered non-household properties. Although there is a CMA process in place to manage SPIDS that are stuck in the system, we suggest that the process needs improving. As leakage approaches the Economic Level, any delay in commencing charging will impact the non-revenue water component and thereby leakage performance.

Data issues:

- The data migration from the LPs databases to CMA's Central Systems database in early 2008 resulted in a significant increase in water records, but not a similar increase in sewerage records. Scottish Water continues to investigate the billing records to identify premises "gaps" and duplicate billings and thereby unbilled unmeasured and measured premises.

- All non-household billing records flagged as vacant are being investigated. The results of the investigations are discussed in detail in the commentary below. This analysis includes addressing the question of the numbers and status of unmeasured non-household water troughs.

- Low Volume Interface for data entry - Scottish Water has visibility of data it enters, but it does not leave an audit trail. LVI is primarily used for viewing and tracking data. High Volume Interface for data entry leaves an audit trail but Scottish Water does not have visibility of the records. This primarily relates to submitting meter reading data and correcting or changing attributes. There is a need for different levels of security for different users and processes.

Calculation issues:

- Since last year a process has been introduced for automatically managing meter rollover.

- A zero meter reading record can result from premises becoming vacant without being reported, no access to the meter or because the meter has failed.

Whatever cause of the zero reported consumption, the "data" should be recorded, quantity and value of water assigned and the effective consumption reported through the CMA for inclusion in the water balance.

- The CMA process for each charging month includes an 8 month reconciliation process within which there are 4 reconciliation stages. Therefore for financial year reconciliation the annual consumption up to March will only be available at the end of December (9 months after the reporting period). In order to report water usage and the water balance for the AR schedule, the reconciled usage for the 12 previous months is aggregated, recognising that the volumes for only 4 months will be final (R3) reconciliation and that the volumes for the remaining 8 months will be based on different stages of the reconciliation process. Scottish Water reports that, although not ideal, the process has worked more smoothly during 2009-10 and that it is starting to see more robust initial estimates and early reconciliations that are nearer to the R3 reconciliations.

As stated last year the above adds uncertainty to the reported numbers in the A tables and, by default, also have a negative impact on any assessment of the operational efficiency of Scottish Water. Data accuracy and thereby confidence in the reported property numbers and consumption volumes is the responsibility of all the stakeholders as is investigating and correcting data anomalies, and addressing procedural issues in order to minimize volumetric and financial "leakage". We recognise that Scottish Water, the CMA and LPs are coordinating efforts to resolve a number of the issues relating to non-household billing data. However we recommend that Scottish Water concentrates on those data sets with the greatest uncertainty for the water balance.

Additional line specific observations are included in the commentary below.

Methodology – Water

Unmeasured Domestic Property Data

Scottish Water has used a consistent methodology for reporting and forecasting property and population numbers. The methodology is unchanged from that used for AR09 and SR10 Business Plan and is essentially the same as it was for the AR08 return when significant improvements were made to the methodology to reflect the improved quality of source data and to take account of the change in national policy for dealing with second homes and long term vacant properties. The approach uses the data listed above.

Scottish Water has based the number of unmeasured domestic properties receiving water and wastewater services on the 2009 WIC4 mid year return (30th September 2009) using the changes in discounts first reported in AR08. The WIC4 data includes the following returns for each council area:

- 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.

Scottish Water uses the Ctaxbase returns for each council and a whole of Scotland data set 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 (as for AR09, 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

As stated above data from one Unitary Council, Mid Lothian did not include the numbers for the New Reduction Scheme. Scottish Water therefore used the WIC4 2008 reported numbers to apportion the new reductions for September 2009. This represents the only significant methodology change.

WIC4 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 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).

Population growth was taken from the GROS 2008 data and as used in the final determination applied to the 09/10 mid year population. However the 2008 dataset did not project households, so Scottish Water has applied the GROS 2008 population data to the GROS 2006 household to derive household growth. The same growth rate was used for both water and wastewater.

The total by band and discount category is reported in the P tables. The P tables were not audited for this annual return.

Measured Domestic Property Data

Measured property data for the A and P tables have been provided by CMA and the Scottish Water Ellipse system for measured domestic properties. There has been a reduction in both measured household and measured non-household connections.

Unmeasured Non-household Property Data

Unmeasured non-household data has been derived from the CMA source data from Central Systems and used directly to generate the table line values.

Between the AR08 and AR09 reporting periods, there was a significant increase in the number of unmeasured non-domestic properties. The increase resulted from data source and methodology changes following business separation and billing data migration by the CMA. Reasons for the significant changes were not apparent from the data supplied by CMA, and it was clear that there were a number of anomalies that needed to be resolved. Scottish Water, the CMA and the LPS commenced a study in November 2009 to understand and resolve the anomalies in a data set of about 49,211 data entries flagged as "Vacant" for both measured and unmeasured non-household connected properties. The project is expected to be complete in July 2010 but all data corrections are unlikely to be effective before October 2010. It is therefore likely that the returns for AR11 will also be based on some anomalous data. Indeed it is of concern that of 30,922 records that have been investigated and reclassified to date, by the end of the CMA accounting period "March R1 09" (equivalent to March 2010) only 170 records have been amended by the LPs from "Vacant" to "Occupied" of a total of 7047 identified for correction.

The following table summarizes the findings from the study of vacant flags and assesses their implications. A similar table could be developed for the 51,090 sewerage Supply Points included in the study.

Measured and unmeasured non-households	**Vacant survey results from 30922 records**		**Projected for study data set**	**Potential change to reported numbers**
SPID category	**Water**	**%**	**Water**	
Duplicate	8,114	26.24	12,913	Reduction to A1.8 and/or A1.9
Occupied non-household	7,047	22.79	11,215	Increase to A1.3 and/or A1.4
Vacant non-household	5,276	17.06	8,395	No change – 'Vacant' estimate
Invalid address	3,220	10.41	5,123	Some reduction to A1.8 A1.9 *
Premises not found	2,614	8.45	4,158	Some reduction to A1.8/ A1.9 *
Domestic	2,467	7.98	3,927	Increase to A1.1 and/or A1.2
Demolished, derelict	1,878	6.07	2,987	Reduction to A1.8 and/or A1.9
Split, merged and tourism	306	0.99	487	Increase to A1.3 and/or A1.4
Total	**30,922**		**49,211**	
Potential change to A1.1 + A1.2			+ 3,927	
Potential change to A1.3 + A1.4			+ 11,702	
Potential change to A1.8 + A1.9			Range (- 19,827 to - 29,108) *	
Note * Assuming that some records are found to be valid non-household records				

The table illustrates the potential over estimation of vacant and thereby connected measured and unmeasured non-household and a possible order of magnitude of the actual number of vacant connected properties. The range of the potential reduction to the A1.8 and A1.9 numbers are in the order of the increase in 'void' properties between 2007/08 and 2008/09.

The following table summarizes the non-household numbers reported in the A tables together with explanations for the differences.

<table>
<tr><th>Ref</th><th>Description</th><th>2007-08</th><th>Difference</th><th>2008-09</th><th>Difference</th><th>2009-10</th></tr>
<tr><td>A1.3</td><td>Unmeasured non-household billed properties</td><td>48,759</td><td>+ 5,161</td><td>53,920</td><td>- 6,963</td><td>46,957</td></tr>
<tr><td colspan="7"><u>Difference AR08 – AR09:</u> CMA data. Increase resulted from migrating fixed charge field trough SPIDs with some multiple troughs per SPID.</td></tr>
<tr><td colspan="7"><u>Difference AR09 – AR10:</u> CMA data including transitional meters. Reduction due to removal of 20mm service element (4,961 Trough SPIDs) and 2261 moved from occupied to vacant offset by net 259 new connections.</td></tr>
<tr><td colspan="7"><u>Reporting from AR11:</u> For AR11, change will relate to economy and "occupied" vacant properties reclassified before October 2010. From AR12, all 'Transition' metered will be reported in metered numbers</td></tr>
<tr><td></td><td>Vacant unmeasured non-household connected properties</td><td>6,397</td><td>+ 19,528</td><td>25,925</td><td>+ 1,314</td><td>27,239</td></tr>
<tr><td colspan="7"><u>Difference AR08 – AR09:</u> CMA data. Increase from properties in migration process flagged as Vacant.</td></tr>
<tr><td colspan="7"><u>Difference AR09 – AR10:</u> CMA data. Reduction of 947 Vacant field trough SPIDs from trough analysis and increase in vacant SPIDs = 2,261.</td></tr>
<tr><td colspan="7"><u>Reporting from AR11:</u> From AR11. Number of Vacant properties should be reduced following reclassification and data cleansing on completion of Vacant properties study in October 2010. Changes will not be complete by the September data abstract so further reductions resulting from the study will be reported in AR12.</td></tr>
<tr><td>A1.8</td><td>Unmeasured non-household connected properties</td><td>55,156</td><td>+ 24,689</td><td>79,845</td><td>- 5,649</td><td>74,196</td></tr>
<tr><td>A1.4</td><td>Measured non-household billed properties</td><td>76,513</td><td>- 1,336</td><td>77,849</td><td>- 2,018</td><td>75,831</td></tr>
<tr><td colspan="7"><u>Difference AR08 – AR09:</u> CMA data. Small reduction quantified through database records.</td></tr>
<tr><td colspan="7"><u>Difference AR09 – AR10:</u> CMA data. 2056 movement to Vacant offset by 38 net new connections in year</td></tr>
<tr><td colspan="7"><u>Reporting from AR11:</u> Expect similar movement in future with additional reductions resulting from Vacancy project in AR11 and AR12 returns and all 'Transition' records in AR12.</td></tr>
<tr><td></td><td>Vacant measured non-household connected properties</td><td>3,144</td><td>+ 11,290</td><td>14,434</td><td>+ 2,056</td><td>16,490</td></tr>
<tr><td colspan="7"><u>Difference AR08 – AR09:</u> CMA data. Increase resulted from properties in migration flagged through process as Vacant.</td></tr>
<tr><td colspan="7"><u>Difference AR09 – AR10:</u> CMA data. 2056 movement to Vacant during year.</td></tr>
<tr><td colspan="7"><u>Reporting from AR11:</u> From AR11 and on completion of Vacant study in October 2010, the number of vacant properties should be reduced following reclassification and data cleansing. Changes will not be complete by the September data cut-off so further reductions resulting from the study will be reported in AR12</td></tr>
<tr><td>A1.9</td><td>Measured non-household connected properties</td><td>79,657</td><td>+ 12,626</td><td>92,283</td><td>+ 38</td><td>92,321</td></tr>
<tr><td></td><td>Total connected non-household properties</td><td>134,813</td><td>+ 37,315</td><td>172,128</td><td>- 5,611</td><td>166,517</td></tr>
<tr><td></td><td>Total vacant non-household properties</td><td>9,541</td><td>+ 30,818</td><td>40,359</td><td>+ 3,370</td><td>43,729</td></tr>
<tr><td>Reported in A1.3</td><td>Fixed charge troughs</td><td>7,828</td><td>+ 5,699</td><td>13,599</td><td>- 1,983</td><td>11,616</td></tr>
<tr><td colspan="7"><u>Difference AR08 – AR09:</u> SW Wholesale data. Increase resulted from migrating fixed charge field trough SPID data with some multiple troughs per SPID.</td></tr>
<tr><td colspan="7"><u>Difference AR09 – AR10:</u> SW Wholesale data. Reduction currently not clear but is most likely linked to DMA studies outputs and Vacant study to resolve data anomalies (duplicate records, site locations surveys and metered troughs re-categorised).</td></tr>
</table>

Ref	Description	2007-08	Difference	2008-09	Difference	2009-10
Reporting from AR11: CMA data						
Not reported	**Unbilled troughs**	21,468	- 14,854	6,146	0	6,146
Difference AR08 – AR09: 07/08 number based on initial field survey of 8 rural DMAs of fixed charge to unbilled troughs. Reduction resulted from further surveys in 54 DMAs during 08/09.						
Difference AR09 – AR10: Although Fixed charge numbers reduced, SW assumes the same number of unbilled troughs as 08/09.						
Reporting from AR11: Number should reduce through investigations to locate, reclassify and bill unbilled troughs						
Not reported	**Total unmeasured troughs**	28,900	- 9,155	19,745	- 1,983	17,762

The 2009/10 fixed charge trough billing data were supplied by Wholesale. The number of 'Fixed charge trough' records has been reduced by 1,983 to 11,616. For AR09, the number of unbilled troughs was estimated based on 0.45 unbilled troughs per fixed charge trough, 6146. Assuming that the ratio is still applicable, a revised number of unbilled troughs would be 5250 (- 896). However Scottish Water has assumed that the unbilled trough number is the same in both 2008-09 and 2009-10. Since the number is only used in the water balance calculation for demand and underground supply pipe leakage, and the difference in water volume is insignificant, the higher number is accepted because of the uncertainty in the total number of unbilled troughs. However we recommend that more work is undertaken to understand the numbers of unbilled water troughs and estimate water demand for the water balance for future returns.

Properties Connected during the Report Year

All new connections are recorded on a Scottish Water WAMS/Ellipse system from which reports can be produced by month, year or for a defined period.

Methodology – Wastewater

The methodology for reporting non-household billed properties for surface and roads drainage is similar to that used in previous years with the distinction that the CMA has provided the customer data since AR09.

The data processing of the CMA and depositing of data in the Reconciliation Mart is the same as for water supply non-domestic properties given above and is not redescribed in detail here. The sewerage service has been affected in similar ways to the water supply service and for similar reasons, mostly to do with the numbers of void or vacant properties recorded. When the CMA was set up and the data migrated from the previous Hi Affinity software, a number of properties were found that were not flagged as "Vacant" but were also not billed. To avoid these being lost from the system they were included in the CMA database as void properties and largely contributed to approximately 24 000 rise in void properties to a total of 31 383 in AR09. We note the study set up between Scottish Water, the CMA and the LPs in November 2009 to understand and resolve the anomalies. As the sewerage service 31,383 cases are a subset of the water supply 49,211 cases, the study will have similar effects.

We were informed at the audit that "measured" properties are defined as those fully charged for the services received and that "unmeasured" includes properties that are metered but where a transitional charge is applied.

The following table summarizes the non-household numbers reported in the A Tables together with some explanations for the differences. Most changes appear to be with in normal annual variation at less than 3% a year and an exact analysis has not been undertaken.

<table>
<tr><th>Ref</th><th>Description</th><th>2007-08</th><th>Difference</th><th>2008-09</th><th>Difference</th><th>2009-10</th></tr>
<tr><td>A1.14</td><td>Unmeasured non-household billed properties</td><td>45197</td><td>-1410</td><td>43787</td><td>-1672</td><td>42115</td></tr>
<tr><td colspan="7">Differences in this line at 3% per annum appear within normal annual variation. It is not clear that data migration and properties flagged as "Vacant" have any effect.</td></tr>
<tr><td colspan="7">Reporting from AR11: Further movements will be caused by properties that should have the "Vacant" flag removed and are either billed or deleted as a false entry. Other movements will follow the drive for universal metering and the effects of the national economy.</td></tr>
<tr><td>A1.15</td><td>Measured non-household billed properties</td><td>57609</td><td>-405</td><td>57204</td><td>-1358</td><td>55846</td></tr>
<tr><td colspan="7">Difference AR08 to AR09: CMA data. Migration of billed properties included some also flagged "Vacant" but the decrease is small and it is unclear whether the decreases are due to data clarification or normal annual changes.</td></tr>
<tr><td colspan="7">Difference AR09 to AR10: CMA data. May be a decrease in billed properties because more have been flagged as "Vacant". Figures should increase slightly as some properties have transitional arrangements removed.</td></tr>
<tr><td colspan="7">Reporting from AR11: Further movements will be caused by properties that should have the "Vacant" flag removed and are either billed or deleted as a false entry. From AR12 all "Transition" metered properties will be recorded in the metered numbers. Other movements will follow the drive for universal metering and the effects of the national economy.</td></tr>
<tr><td>A1.25</td><td>Unmeasured non-household billed properties not billed for property drainage</td><td>27</td><td>51</td><td>78</td><td>7</td><td>85</td></tr>
<tr><td></td><td>Measured non-household billed properties not billed for property drainage</td><td>405</td><td>892</td><td>1297</td><td>1</td><td>1298</td></tr>
<tr><td colspan="7">These are smaller numbers billed for road drainage only by virtue of a known sewer connection. After a substantial rise in AR09, AR10's figures show smaller differences.</td></tr>
<tr><td>A1.28</td><td>Non-household properties billed for surface drainage only</td><td>11190</td><td>1002</td><td>12192</td><td>-673</td><td>11519</td></tr>
<tr><td colspan="7">These are properties without a sewerage connection but where the surface water reaches a public sewer.</td></tr>
<tr><td colspan="7">Difference AR08 to AR09: CMA data. Possible that the increase was caused by the migration of billed properties which are also flagged "Vacant"</td></tr>
<tr><td colspan="7">Difference AR09 to AR10: CMA data. Better understanding of 423 SPID pairings in the CMA data has resulted in a corrected SPID classification in AR10. 250 had their drainage status changed for other reasons.</td></tr>
</table>

Ref	Description	2007-08	Difference	2008-09	Difference	2009-10
A1.32	**Unmeasured non-household connected properties**	63566	-1780	61786	-1687	60099
A1.33	**Measured non-household connected properties**	57304	24101	81405	1674	83079
A1.32 and A1.33	**Unmeasured and measured non-household connected properties**	120870	22321	143191	-13	143178
These are properties connected for surface water (either for road drainage or for property only or both). The consistent reduction of unmeasured properties is associated with the drive to metering.						
Difference AR08 to AR09: CMA data. The increases in lines 32 and 33 together are thought to be associated with the migration into the CMA of billed properties also flagged "Vacant"						
Difference AR09 to AR10: CMA data. Little change and therefore little removal of void properties.						

During the audit we were shown 11 cases that were in the CMA data but were not included in the AR10 non-household properties because of data loading problems. The A Tables were subsequently restated prior to final submission to correct this issue.

We conclude that there are several reasons for movement between the years. These include: movement from transitional tariffs to full ones, decreases related to the national economy, the drive to metering and the effect of the "Vacancy" flagging for water supplied. The 22,321 increase in non-household connected properties (Lines 32 and 33 together in AR09) is due to the increase in void properties at migration already mentioned in relation to both water and foul sewerage. The study set up between Scottish Water, the CMA and the LPs in November 2009 is addressing this issue.

Methodology – Trade effluent

The methodology for trade effluent is not the same as in AR09, when Scottish Water used the Second Draft Business Plan and its own data sources to develop the return figures. This year Scottish Water has more confidence in the CMA data and has used it. Scottish Water believes that it is more complete and less volatile.

The CMA data and its movement between Licensed Provider (LP), the Central Marketing Agency (CMA) and Scottish Water (SW) are described above. The general issues raised above, including void or vacant properties, also apply to trade effluent.

Trade effluent figures for the return are based on the Reconciliation Run of March 2010 and contain:

P Provisional run for March 2010
R1 First reconciliation runs, February and January 2010
R2 Second reconciliation run for December 2009
R3 Third reconciliation run for June 2009

This means that further refinements in the figures could be made when the final reconciliation is undertaken around December 2010.

The total data comprises about 18000 lines for 1500 DPIDs (Discharge Point Identities) billed in the period. Each discharger has a unique number followed by a letter differentiator to show multiple discharge points, and a further serial number to allow the DPID to cease and be restarted.

At each reconciliation Scottish Water calculates the wholesale charges for each trader from the volumes provided by the CMA and queries those charges that do not tally with the CMA figures. Normally charges for individual traders are agreed within £0.10 and Scottish Water concludes that these lines are correct. DPID charges outside this limit are queried; the total of variances is minus £1,294 to plus £430 in £23,303,168, a high level of agreement.

However, within the CMA figures it is possible to detect apparent anomalies in meter readings. We were able to inspect a small sample of eight DPIDs to verify the volumes presented and the types of anomaly that occur.

- DPIDs that are part year. DPIDs have chargeable days which Scottish Water uses to annualise volumes and loads to the year's total liability. However, this technique may overestimate Scottish Water's treatment liability, although the effect is diminished because of the overall numbers of traders, and small proportion of part year cases (5%) together with the small size of each of them. We understand that Scottish Water will change its practice for AR11.

- DPIDs that are continuous, but where there are irregular gaps in volumes measured or there are repeats of exact numbers. Scottish Water suspects that this type of record arises from LPs failing to read a meter and estimating the actual volume. If an overcharge should thereby occur, then meter reading records may cease until the flow catches up rather than a negative entry being made. Scottish Water does not have information which would allow estimation of the resulting error, and no means to check for year-end effects. Scottish Water therefore does not modify the CMA data. This type of practice may imply an overestimation of the flows and loads at the year end when taken overall.

The trade effluent figures are used for flow and load calculations in other parts of the return where their errors are diminished by combination with other flows and loads.

Each DPID is registered to a WwTW by the appropriate operations planner. These allocations are used to determine effluent figures by treatment level according to the works type recorded in Ellipse.

Trade effluent strengths are recorded on the basis of settled COD for wholesale charging purposes. In addition, Scottish Water takes a wide range of settled BOD samples, primarily for loads discharged to PPP plants 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, Scottish Water 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 was applied to provide both the trader and the company with reasonable certainty on bills in a period and continues in use in wholesale charging. 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 Figures are reported for all treatment works including PPP works.

Comments by line

Lines 1, 6, 12, 17, & 30: The number of unmeasured household billed properties including exempt and excluding 'void' properties has increased by 19,607 since the previous return.

Growth in connected unmeasured dwellings with water was 14,866 (0.62%) including exempt properties, more than was forecast in AR08 (10,488). The number of exempt properties reduced by 1,149 to a total of 59,388 during the period. The occupancy ratio for occupied households has reduced during the year from 2.17 to 2.16 and is predicted to fall during this coming year to 2.14.

Lines 23, 27: Property drainage is included in the sewerage tariff. Therefore the return against lines is zero.

Lines 2, 7: The number of metered households is small (574) compared with the number of unmeasured households (2,403,787). There has been a reduction of 30 (5%) in the last year which Scottish Water suggests is due to this group of customers being more aware since business separation. Scottish Water is forecasting a further 5% reduction during 2010/11

Lines 4, 9: The number of measured non-household water properties (CMA Central Systems data) has reduced by 2,018 in the year to 75,831 while vacant properties have increase by 2,056 to 16,490. Measured and unmeasured non-household billed and vacant property numbers are discussed in the commentary of the methodology above.

Line 3, 8, 14, 19, 25, 26 & 32: There has been significant movement in the reported numbers for these lines, primarily resulting from the studies to investigate the large changes reported in AR09. The changes to measured and unmeasured non-household billed and vacant property numbers are discussed in detail in the methodology section above.

Lines 11, 22, 35: There were 13,455 new water connections during 2009/10 and 11,706 sewer connections (-28%). 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.

Lines 13, 18, 24, 31: The number of measured household foul sewerage is small (166) compared with the number of unmeasured households (2,264,227). There has been a reduction of 13 (7%) in the last year which Scottish Water suggests is due to this group of customers being more aware since business separation. Reductions in surface drainage numbers result from the Scottish Water investigation and customer interaction referred to above. Scottish Water is forecasting a further 5% reduction during 2010/11.

Lines 15, 20, 26, 33: Measured non-household drainage properties are taken from the CMA Central Systems database. There was significant movement in AR09 in the reported number for all but line 15 which decreased by 405 (0.7%). The increases in the other lines result from numbers generated from the Central Systems data and the migration exercise. Movements in these lines in AR10 have been small.

Line 36: The reported data is the number of properties billed for trade effluent derived from the CMA Central Systems database. Some properties billed in the report year will have been occupied by more than one customer. There has been a 2.2% increase (33 properties) billed in AR10.

Line 37: Connected properties have reduced by 811 to 2575 from 3386 in AR09. The number of connected properties includes all properties for which there is trade effluent consent. 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 un-measured or measured non-household categories. The reduced figure is consistent with CMA data.

Lines 38 &39: The numbers reported against these lines is derived from the CMA Central Systems database using standard conversion factors. There is an apparent 13.1% reduction in BOD loading and 9.9% decrease in COD loading. Part of the decrease was caused by the closure of a papermill with a significant load.

Comments on Confidence Grade

All data abstracted from Scottish Water databases or WIC4 returns for household numbers are graded A2. This applies to lines 1, 6, 11, 12, 17, 18, 22, 23, 30, and 35. We consider the grading reasonable.

At the time of the audit Scottish Water had revised the grades for lines 2, 7, 13, 24, 27 and 31 from A2 to B2. This is in line with the changes made for the AR09 return and reflect the fact that the data has been sourced from the CMA Central Systems database. The line items are for relatively small numbers and the changes introduce consistency for the CMA data. In summary the following lines are now grades B2 reflecting the source of the data; lines 2 - 4, 7 - 9, 13 - 15, 18 - 20, 24 - 28, 31 - 34, 38 and 39. There are still concerns surrounding the accuracy of the CMA data and Scottish Water is working with the stakeholders to improve its quality. However for this return Scottish Water has only manipulated the CMA source to generate the table line figure and there has been less reliance on interpretation or data extrapolation. We therefore consider the grading reasonable.

Lines 36 and 37 are graded B3 as in AR09 and accuracy remains as previously reported. Although there has been considerable work to improve the quality of the data related to trade effluent connections and loads, the estimated loads are still based on records that require some degree of extrapolation from sample data and estimated volumes at year end. Scottish Water still has a lack of transparency with CMA data and hence lower confidence in quantities and hence loadings.

Lines 38 and 39 are derived using standard loading conversions and confidence grades are reasonable.

The confidence grades for Report Year +1 Forecast are reasonable; each forecast item follows the source classification for the line, but the accuracy has been reduced by one level to reflect that it is a forecast.

4.3 Table A2: Population, volumes and loads

Commentary by REPORTER

Introduction

Table A1 and A2 (and Tables P1, P5 and P9) are derived from the same sources of data using the same methodology and the commentary detailed in the previous section for mid year projections.

Key points:

- The winter population is derived from the recently published GROS 2008 based Scotland total projections and a methodology for assessing household size (occupancy ratio), numbers of population in households and numbers not in households. Connection rates are derived from the WIC4 2009 return to calculate populations connected to water and wastewater services.

- Household occupancy ratios have fallen from 2.17 to 2.16 and are forecast to fall to 2.14 during this year.

- 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.

- The per capita consumption (pcc) derived from the Household Consumption Survey (PCC Monitor) which has been applied to Table A2 but not the OPA analysis is 147.81 l/hd/d excluding supply pipe leakage and plumbing losses (estimated in 09/09 at 146.56 l/hd/d). The current 'pcc' value uses 12 months data from the Monitor derived from approximately 110 zones with a 94.6 average reporting of 27.7 days per month. The net effect represents a 10.9 Ml/d (1.5%) increase in the estimated unmetered consumption which is a combination of increased unit usage (0.85%) and increased population (0.65%).

- The total pcc, including plumbing losses and including void properties, is 153.35 lcd (152.36 l/hd/d in 08/09). This figure is comparable with the WASC unmetered domestic average figure for England and Wales of 149.7 l/hd/d in 2008/9. Plumbing losses are estimated to add about 5.5 l/h/d to the Per Capita Consumption.

- There is a discrepancy in Table A2 resulting from how the line items calculate the unmeasured household PCC including plumbing losses (153.76 l/h/d). The net effect is to slightly overestimate the value. The difference results from the line item using an average Underground Supply Pipe Leakage (UGSP) for both occupied and 'void' properties rather than the assessed individual values of 36.60 l/prop/d for occupied properties and 41.11 l/prop/d for 'void' properties. The table calculated figure does not affect other figures in the table

- As previously discussed, 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 includes 11,616 animal trough connections billed as a fixed charge, a reduction of 1,983 from the previous year's estimate (13, 599). The reasons for the reduction is currently not clear but is most likely linked to the work by Scottish Water, CMA and the LPs to resolve data anomalies relating to flags in the billing data associated with vacant properties.

- A sample surveys in rural DMAs concluded that there are an estimated 6,146 unrecorded animal troughs within Scotland in 2008/09 based on the estimated number of fixed charge troughs in that year. There is no evidence to suggest either that the number of unbilled troughs should be reduced for this return or held at the same as assessed for 2008/09. Scottish Water has adopted the latter approach. The impact of the reduction is of the order of 918 unbilled connections corresponding to about 0.6 Ml/d including supply pipe leakage. .

- 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 and included in Water Taken Legally Unbilled using assumptions 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 0.61 Ml/d may be underestimated.

- Distribution losses have reduced to 692.65 Ml/d (including balancing error of 78.35 Ml/d) from 727.85 Ml/d in the previous year. Total reported leakage has reduced by 86 Ml/d to 783.47 Ml/d.

- For the first time this year the table includes lines to report the Bottom- up leakage and a Maximum Liklehood Estimation (MLE) analysis. Bottom-up leakage pre-MLE is 705.12 Ml/d and with a reconciliation adjustment of 33.08 Ml/d, gives a MLE of 738.21 Ml/d.

- The reconciliation error between top down and bottom-up of 78.35 Ml/d represents 3.8% of the Distribution Input compared to 4.3% last year.

- The leakage reduction is comparable with the difference between the reduction in DI and reductions in reported usage.

- We continue to question the ongoing assumption that 95% of water consumed is returned to sewers. However, we note that Scottish Water has correctly applied the figure that had been set down in previous WICS reporting requirements.

Audit Process

During the audit we reviewed:

- The methodology for estimating populations, volumes and loads
- The copies of spreadsheets used to calculate populations, households (from Table A1).
- The Water Balance 2009/10

- Spreadsheet calculations used to derive WB components.
- Scottish Water systems to track back to source data.
- The consistency of data with that reported in the OPA report, A and E tables.

We checked sample lines in the tables to confirm the audit trail back to the base data including regional splits and all components of the Water Balance.

The audit was carried out by interviewing members of Scottish Water's staff responsible for the compilation of the tables and with direct, unrestricted access to data held on Scottish Water information systems.

Comments on Methodology

The sources of data and methodology used to develop household numbers and measured consumption are described in Section 4.2.

Unmeasured and measured domestic per capita water consumption is assumed to be flat for the Year +1 forecast. The forecast for non-household demands is based on the conclusions from the Experian report prepared for the SR10 Business Plan. The report suggests that demand will reduce between 2008/09 and 2011/12, reflecting the current economic conditions. In practice, although there was a significant reduction in metered non-household consumption between 2007/08 and 2008/09 (7.2%), there has not been a corresponding fall in 2009/10 (0.7%). In the light of the flat consumption during 2009/10, we suspect that using the suppressed Experian forecast for 2010/11 for the Year +1 projection may be conservative. Un-measured non-household consumption has reduced during both periods by about 46% and 51%, respectively but the reasons for the reductions are more likely linked to the investigations into the status of billing records flagged vacant rather than a significant reduction in consumption. The preliminary conclusions from the investigations into measured and unmeasured non-household billed and vacant property records are discussed in the commentary on the Table A1 methodology above.

As in previous years Scottish Water provided additional summary sheets for the population methodology and the Water Balance calculations that provided a detailed narrative of the elements making up the water balance for 2009/10. This documentation contributed significantly to being able to understand the detailed calculation behind the table A2 lines. 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.

<u>Line A2.1: Winter Population Estimates.</u>

The winter population is calculated from the GROS and WIC4 data sources detailed above. Calculations are based on mid year estimates. The underlying methodology has not changed.

Scottish Water continues to report the winter population for water and wastewater equal to:

the population in households with water (unmeasured)
\+ the population not in households with water
\+ 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 90,976, an increase of 643 since 2008/09.

Population Projections for "Report Year + 1 Forecast"

Projected Total Populations and Households are derived from the GROS 2006 and 2008 projected population data with growth rates 2007 to 2031.

Population in unmeasured households with water

The occupied household population number is calculated from:

> the 2008 GROS Projected Total Population times the ratio of 2006 Private Household population to total population times the ratio of Water Households to total Dwellings.

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

As stated in Section 4.2 above for the table A1 commentary, the number of Scottish Water connected occupied households is known.

The same methodology is followed for wastewater.

Population not in households with water

The population not in households with water is calculated from:

> the 2008 GROS Projected Total Population less the Private Household Population] times the ratio of Water Households to total Dwellings.

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

The same method is followed for wastewater

Vacant households with water are calculated from:

> the 2009 WIC4 report [2009 Total Dwellings – 2009 Occupied Dwellings] times the ratio of Water Households to total Dwellings.

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

The same method is followed for wastewater

Occupancy Ratio

Occupancy ratio for occupied dwellings has fallen from 2.17 to 2.16 and is predicted to fall to 2.14 in 2010/11. 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. The Scottish Water growth model reflects these two trends. The projection of future populations is calculated using the GROS population projections.

The calculation allocates the GROS estimated increase in households for future years to the WIC4 (AR09 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 AR09. The Band apportioned GROS household growth numbers are then added to the AR09 WIC4 data to project household by bands for Year +1and beyond. The same methodology was used in previous years. Source data and random lines and calculations were audited for 2009/10 and 2010/11.

Line A2.2: Summer Population estimates

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

- Visit Scotland information on average bed space per type of visitor accommodation.
- Visit Scotland information on the monthly occupancy rate for different types of visitor accommodation. Average bed spaces by visitor accommodation is based on 2005 data.
- Allocation of holiday accommodation properties to water supply and drainage area boundaries using the spatially referenced "Yellowpoint" data set of business properties referenced on the corporate GIS. The tourist categories considered by Scottish Water from "Yellowpoint" data were – 'Bed & Breakfast', 'Camping Sites', 'Caravan Parks', 'Guest Houses', ,'Hostels', 'Hotels & Inns', 'Holiday Accommodation, Self Catering' and 'Holiday Accommodation & Parks'.

The tourist population was calculated from the number of bed spaces per property type and the monthly occupancy figures from Visit Scotland. The total number of bed spaces per property type is calculated, and allocated to the water and sewerage operational areas. For all of Scotland the number of occupied bed space nights is calculated from monthly occupancy times the number of bed spaces. 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 bed space night is the number of days in the month times the number of bed spaces times the occupancy rate. The difference in summer and winter populations is the highest tourist population in any one month in the year.

The growth rate for the Report Year +1 forecast is estimated at about 0.4%, higher than was estimated between 2008/09 and 2009/10. (0.14%), but economic conditions are improving

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

Water balance

Introduction

General

Associated with this return Scottish Water has prepared three analyses:

1. An analysis for the OPA calculation using previous year's figures and assumptions suitably adjusted for changes in properties and population. This approach was used for reporting consistency. This used the "Integrated Flow Method" where leakage is the balancing item between top down "Distribution Input" figures and a "bottom up" sum of other components of the water balance.

2. A similar analysis for Table A2 but using current figures.

3. An analysis using the same figures as 2 but measuring leakage from its new DMAs and applying an MLE adjustment.

The preferred method is to measure all inputs including leakage and compare them with DI. Leakage is usually measured using District Meter Areas (DMA) (Method 3 above). For this annual return, additional lines have been added to Table A2 to allow Top Down, Bottom Up and the Maximum Likelihood Estimation (MLE) to be calculated and reported. We give some further details of the method and results below:

With the completion of the DMA programme Scottish Water has been able to directly estimate leakage for AR10 and therefore reconcile the top down (from DI meters) and bottom up (from DMA flow records and other leakage component estimates) can be made. Provided that the reconciliation is within 5%, an "MLE" adjustment can be applied to finalise individual component values. This allocates the difference between the top down and bottom up values in proportion to the assumed uncertainty in the component estimate.

For the audit the data to be included in the A2 and E6 tables was reviewed including the Maximum Likelihood Estimate (MLE) leakage analysis. The methodologies used to prepare the top down leakage estimate were consistent with previous years but have benefited from improved data resulting from data cleansing activities and studies completed in recent years and the review of non-household data discussed in detail for Table A1 above. For the second year, Scottish Water has been able to also calculate a bottom up leakage estimate using DMA derived data from 2,795 DMAs covering 95.6% of the population with 85.7% reportability.

The reported closing error is 3.8%, equivalent to 78.35 Ml/d between top down and bottom up water balance calculation. For the MLE calculation Scottish Water used the mid-point of the confidence grading range assigned to the individual components of the water balance. The mid-point of the confidence grading range assigned to the individual components of the water balance was used for the MLE. If the upper-limit for the CG range for each component were to be used, a sensitivity analysis suggests that it would make only a marginal difference; 1.2 Ml/d (739.4 Ml/d).

The three approaches are summarized in the following table:

Ref	Description (Ml/d)	2006-07	2007-08	2008-09	2009-10	Difference	CG
	OPA leakage	1003.8	924	801.7	703.6	- 98.1	
	Leakage Target (OPA)	960	855	840	730	- 110.0	
A2.30	Total leakage from the top down analyses			869.1	783.5	-85.6	B3
A2.42	Directly estimated leakage from bottom up analysis			775.9	705.1	- 70.8	C4

Ref	Description (Ml/d)	2006-07	2007-08	2008-09	2009-10	Difference	CG
A2.44	MLE Adjusted leakage			816.4	738.2	- 78.2	B3

All methods demonstrate a progressive reduction in leakage to an MLE value of 738.2 Mld this year.

Our overall impression is that the Water Balance analysis and related methodologies is a consistent and thorough analysis based on auditable data sources.

Further commentary on the water balance and leakage is given in the Reporters Report titled Scottish Water's OPA Score 2009-10, May 2010 and in the commentary for individual lines below. We recognise that the calculation for the OPA, based on last year's methodology, demonstrates Scottish Water performance for 2009/10 compared with previous years. However we welcome the adoption of the methodology based on the AR09/MLE approach and believe that will be a more robust performance measure for future years.

Continuous Area PCC Monitor

Continuous Area PCC Monitor (Household Consumption Survey) comprising 6,817 domestic properties in 114 survey areas is being used to estimate the unmeasured per-capita domestic consumption. During 2009/10, there was an average area reporting of 94.6%, 27.7 days per month.

The design and implementation of the Monitor has been based on the UKWIR report, "Best Practice for Unmeasured Per Capita Consumption Monitors". The methodology adopted by Scottish Water is outlined in "*Unmeasured Domestic Per Capita Consumption, AR10 Methodology Statement, April 2010*".

Each area has been selected to be a homogeneous socio-economic grouping with no metered domestic users as well as single feeds and minimum leakage. Area selection was based on ten ACORN socio economic classification groups, with the full set of Monitor areas having the same socio economic mix as the overall Scottish Water customer base. For our AR09 report, we audited 5 areas at random and confirm that the socio-economic groups had been correctly identified and that the overall socio-economic mix of the monitor reflects the overall mix of Scottish Water's customers. There have been no changes to the areas in 2009/10.

The Monitor areas are geographically spread throughout Scotland and provide reasonable representation of a combination of population density and the Water Resource Zones. However the SR10 Business Plan includes funding for an additional 20 areas intended to improve the rural spread representation.

Scottish Water has not attempted to estimate PCC at an operational area or water resource zone level for the reporting year. Scottish Water has not attempted to estimate PCC for different household sizes for the reporting year.

Electromagnetic flow meters are being used to monitor flows into all Monitor areas. For this reporting year the data has not been adjusted for meter error / under registration. Scottish Water states that meters will be regularly monitored and assessed for performance and will be subject to a 5 year planned verification and replacement programme.

When each area was set up, all households within the area were asked to complete a survey form. No additional surveys have been completed during 2009/10. The survey form included questions to estimate household occupancy and thereby the area occupancy ratio. The occupancy ratio for each Monitor area is assumed to be equal to the ratio derived from the returned forms adjusted for the national average vacancy rate Scottish Water plans to resurvey households in the Monitor areas every 4 years. The Monitor area data is further adjusted for the national average percentage of institutionalised household occupants. The conclusion from the surveys was that the average occupancy ratio of the 110 Monitor areas is 2.17, where for AR10, the national average figure is 2.16.

The effect of both adjustments will be to proportionally reduce the Monitor area population and thereby proportionally increase the PCC. Both assumptions are therefore fundamental to the accuracy of the calculated PCC. In the light of the annually changing occupancy ratio used elsewhere in the water balance, we recommend that households in the monitored areas should be resurveyed regularly. Over the 5 years of SR10, using the equivalent Scotland national average occupancy ratios the reduction could result in a total household population reduction of about 2.3% and corresponding apparent pcc increase of 3.5 l/hd/d. We accept that it may be impossible for Scottish Water to assess this parameter individually, particularly in those areas with a high percentage of rented accommodation. Nevertheless Scottish Water might like to investigate in one or two sample areas whether regular contacts with local authorities, the land registry or housing trusts could be used to obtain more accurate vacancy information at reasonable cost.

Data are screened manually to identify gaps and anomalous data. Validated data are used to calculate the monthly average daily consumption for legitimate data within the month. Gaps in the data are not in-filled.

Using the minimum night flow data Scottish Water infers an average legitimate night use (LNU), of 1.5 l/p/hr capped at a maximum of 2.2 l/p/hr, thus ensuring that leakage is excluded from PCC calculation. Any minimum night flow above this figure is assumed to be leakage which is deducted from measured inflows to derive consumption. The figure of 2.2 l/p/h assumes 1.7 l/p/h legitimate use and 0.5 l/p/h plumbing losses; both based on UKWIR "Measuring Leakage, Best Practice". PCC zone leakage monitoring and reporting is based on the identification and separation of the LNU at the minimum 15 minute flow each night which typically occurs between 3:00 and 4:00 hrs.

Scottish Water reports that preliminary results from a fast logging study in 48 Monitor zones suggest a composite LNU for the monitor areas of about 1.59 l/p/hr including internal plumbing losses. We commend Scottish Water for the initiative and encourage Scottish Water to consider how this approach could be extended to form the basis of leakage estimation throughout the PCC Monitor.

The only methodology change implemented for AR10 was to calculate pcc weighted by population for this return rather than by zone as for AR09. The difference between methodologies is summarized in the following table:

Ref	**Description (Ml/d)**	**2008-09**	**2009-10**	**CG**
	pcc weighted by zone	152.4	*152.9* [1]	
WB Calculation	pcc weighted by population		153.4	
A2.25	pcc (calculated in table)	153.02	153.76	B2

Note 1: Calculated during audit for sensitivity analysis

We consider the new methodology more robust.

We are still of the opinion that Scottish Water's work to derive the domestic per-capita consumption is thorough and competent. However as last year we recommend that Scottish Water considers how in the longer term to:

- Assess meter error / under registration.
- Resurvey households more frequently than every 4 years.
- Extend the LNU fast logging studies.
- Analyse daily and seasonal variations by regions, zone and ACORN grouping
- Analyse variations in PCC by Region and by the different ACORN socio economic groups.

Below we describe Scottish Water's calculations that went into Table A2.

Line A2.26: Unmeasured per-capita domestic consumption

Table A2, line 26 is a calculated number generated from other data in the table.

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; those billed at a zero rate. Alternatively such properties could be allocated to water taken legally unbilled, Line A2.27.

The population reported in this table and used in the calculations for Tables B9 and the water balance are consistent and derived from the population and household calculations commented on in Section 4.2.

Plumbing losses

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

For this reporting period plumbing losses are estimated to add about 5.3 l/h/d (5.8 l/h/d in AR09) to the Per Capita Consumption (including 'void' properties and excluding Underground Supply Pipe Losses) of 153.35 l/h/d. This is a reduction of about 0.5 l/h/d from the pervious reporting period. Plumbing losses are added to the base unmeasured PCC.

Line A2.13: Measured household consumption

There are 573 measured household connected properties (see commentary for Table A1 above). Consumption is recorded by meter and, subject to meter under-registration, should be accurate. Measured consumption, at approximately 176.4 l/h/d, has reduced by about 4 l/h/d from the reported consumption in 2008/09. It is higher than the estimated unmeasured consumption and the weighted average from the pcc Monitor. 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 A2.14: Unmeasured non-household consumption

We discuss the anomalies in the reported numbers of unmeasured non-households in Section 4.2 – Table A1 above. There has been considerable movement during the year in understanding variations in reported numbers and consumer categories and the full business metering (FBM) programme has enabled Scottish Water to use meter readings to quantify consumption from all connections already metered.

The consumption of unmeasured non-households which are still to be metered is assessed using the same methodology that is by interpolation using consumption figures from measured non-household consumers using industrial WICS sector codes (e.g. hotels, banks) and rateable value as the variables. A core assumption was that two properties with the same industry sub-sector code and rateable value would consume the same volume regardless of whether they were metered or not.

We understand that full business metering (FBM) will achieve volumetric billing for the majority of unmeasured customers by 2012. To date the data derived from the metering programme has resulted in the unmeasured non-household consumption reducing over the last three years, with a further significant reduction in 2009/10. The effective changes in reported consumption for Line A2.14 are:

Unmeasured Non-household		**AR08**	**AR09**	**AR10**	**Difference**
Property numbers					
Billed properties **Line A1.3**	No.	48,759**	53,920	46,957	- 6,963
Void unmeasured properties	No.	6,397	25,925	27,239	1,314
Connected properties **Line A1.8**	No.	55,156**	79,845	74,196	- 5,649
Water Delivered					
Billed properties	Ml/d	64.31	33.61	16.03	- 17.58
Vacant properties	Ml/d	0.37	1.65	1.39	- 0.26
Line A2.14	**Ml/d**	**64.68**	**35.26**	**17.42**	**- 17.84**

*Note: ** Pre CMA data migration*

Unmeasured water troughs are not included in either the number of connections or the estimated consumption in this line.

Scottish Water has assigned Confidence Grade C5 to reflect the uncertainty of the CMA reported data source and analysis process. The methodology used for this return is considered more logical than that used previously and with increased availability of connections with meter readings, the quality of the statistical analysis will improve. By 2012, the majority of this category of non-household consumers will be reassigned to the measured category.

Line A2.15: Measured non-household consumption

Consumption is recorded by meter and, subject to meter under-registration, should be accurate. However measured non-household meter readings are now supplied by the CMA from its Central Systems database. Measured non-household consumption is calculated from the combination of actual meter readings estimates derived from the

CMA data of yearly estimates where valid sets of actual meter readings do not exist. The potential uncertainties with the data are discussed in Section 4.2 above.

The quantity 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 is higher in the summer period than the winter period over which the extrapolation is used.

As in previous years there is no incentive for potential meter optants to apply for a meter while the Full Business Metering project is running.

<u>Line A2.20: Measured non-household (non-potable)</u>

The methodology for reporting this line has changed fro AR10. Scottish Water is reporting the measured consumption derived from CMA data through 15 meters linked to 9 Supply Point IDs. The method of calculating the annual consumption is as is described for Line A2.15 above. In addition there is one customer with a licence volume (capped agreement) of 4.5 Ml/d.

The reported volume of non-potable water is 10.79 Ml/d which is made up of 5 metered supplies (6.29 Ml/d) and the licence volume. The total measured volume has decreased by 32% from the previous return.

As previously recommended we suggest that for Scottish Water to better understand the licence volume the supply to this consumer be metered even if the method of billing remains unaltered.

<u>Line A2.37 and A2.38: Meter under-registration</u>

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 which, was 4.0% for 2008/09. While this is a generally accepted figure our experience is that this may be high. As Scottish Water only has 573 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 was 4.6%, for 2008/09. This figure is consistent with our knowledge for companies that regularly re-calibrate meters. We therefore consider that the resulting estimate is acceptable.

Lines A2.32 to A2.36 Underground supply pipe leakage

Underground supply pipe leakage is added to consumption to calculate water delivered. The methodology for the calculation of underground supply pipe leakage has changed for this return in that the number of leaks on supply pipes has been estimated from Scottish Water's records of the numbers of leaks located and repaired during the year.

For previous returns, Scottish Water investigated 100 supply pipe leaks to establish flow rates. The analysis suggested a flow rate of 0.79 m^3/hr/burst at an Average Zone Night Pressure of 50m. Burst rates are currently about 1.58 per 1000 properties overall (0.74 for swept DMAs and based on the results from swept DMAs, 2.02 for unswept DMAs). These are significant reductions on previous years reported rates, primarily related to the reduction in burst rates used. For the Water Balance, Underground Supply Pipe Losses are estimated to be 90.82 Ml/d which is 50.42 Ml/d lower than in 2008/09.

Scottish Water uses published Ofwat data for England and Wales (2008/09) to calculate supply pipe losses for the different property types that is reported in lines A2.32 to A2.36. No measured household meters are installed internally.

Accepting that there is a significant reduction in the reported USP leakage, we conclude that:

1. All estimates of supply pipe leakage are uncertain.
2. We recommend that Scottish Water extends its studies and investigations to challenge or validate current assumptions and ratios.
3. Scottish Water should record awareness and repair times and use the data to benchmark itself against other company performances.
4. Even though the current figures are uncertain we accept that the approach is reasonable.

Lines A2.18 and A2.30 Leakage

The prime tool used in Scottish Water's active leakage control (ALC) strategy is to measure flows at night when consumption is low in district meter areas (DMAs). There are now 2,795 operational DMAs, an increase of 22 since AR09. DMAs cover 95.6% of the population supplied. DMA reportability for the year was 85.7%.

The 2009/10 Water Balance calculation is summarized as:

- Distribution losses have reduced to 692.652 Ml/d from 727.854 Ml/d in the previous year.
- Total reported 'Top Down' leakage has reduced by 85.6 Ml/d to 783.473 Ml/d. A detailed leakage management discussion is included in the Reporters Report titled Scottish Water's OPA Score 2008-09, May 2009 and is not repeated here.
- The leakage reduction is comparable with the combined reduction in DI and changes in 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 below. Commentary on individual lines in the table is included in their relevant sections.

Ref	Description	Unit	2007-08	2008-09	2009-10	Difference
A2.11	DI	Mld	2271	2144	2044	- 100
	Unmeasured domestic (PCC)	lcd	146.98	146.56	147.81	+ 11 (Ml/d)
A2.14	Unmeasured non-household consumed	Ml/d	65	35	17	- 18
A2.15	Meter non-household water consumed	Ml/d	464	431	428	- 3
A2.27	Water taken legally unbilled	Ml/d	63	60	56	- 4
A2.30	Leakage	Ml/d	924	869	783	- 86

- The changes result from the analysis of the 2009/10 pcc Monitor (+11 Ml/d) and measured bill records and studies completed during 2008/09 (-25 Ml/d). All estimated figures remain uncertain.

- The balancing error, to reconcile distribution input with the water balance components was 78.35 Ml/d (3.8%). This compares with 93.18 Ml/d (4.3%) in 2009/09.

- Scottish Water estimates that service reservoir leakage at 9.29 Ml/d (9.24 Ml/d in 2008/09), based on "Managing Leakage" default value of 0.333% per day of storage capacity. The calculation uses the reported storage capacity from the WAMS database. 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 increasingly important as Scottish Water moves towards its ELL and relies on the bottom up leakage estimate.

- Trunk Main losses are derived from data extracted from the GIS for all 300mm diameter mains and larger; a total of 3,130 km. Using age data included in the GIS, leakage is estimated using the UK industry default value of 0.2m3 per km of main per year of age per year. For 401 records (of 10,606 records) to which an installation age has not been assigned (3.7% by no of records, 1.5% by length), the length weighted average age of records with known ages was used. A sensitivity analysis comparing the average age derived from the number of records by age band with a weighted average age using length changed the average age by 1 year which when applied to the records without an age. Although Scottish Water adopted the length weighted approach following the audit, the change made no material difference to Trunk Main leakage.

Line A2 -17: Water taken legally unbilled

In the previous return, Scottish Water has reported a significant increase in water taken legally unbilled, primarily resulting from reassessments of Waste Water Treatment Works usage and the inclusion of unmeasured and unbilled cattle troughs. For this return, Scottish Water has continued to investigate individual line item components and has concluded that there has been a small overall reported reduction of 4.53 Ml/d to 55.66 Ml/d.

The comparative component quantities are detailed in the table below:

A2.27 Water taken legally (Ml/d)	2006-07	2007-08	2008-09	2009-10	Comments
Fire fighting	13.12	14.97	13.23	14.54	Flow rates as 07/08. Based on reported fires – incident data from individual fire authorities.
Standpipe volumes	16.01	12.41	13.99	12.39	Reduction in recorded licences
WWTW use	3.79	15.73	16.62	14.55	Based on site specific readings at 72 sites (31% of PE) extrapolated to 692 works
SW Offices and depots	0.40	0.32	0.18	0.16	Reduction in SW staff. SG usage statistics applied to SW staff only
SW Jetting	0.99	1.08	1.01	1.07	Historic record of demand per event. Events recorded on Corporate system
Animal troughs	0	16.35	13.96	12.30	See commentary below
Temporary building connections	0	2.31	2.17	1.25	See commentary below
Total A2.27	34.49	63.18	60.19	55.66	Difference = - 4.53 Ml/d

Fire Service demand: The methodology for Fire Service demand is unchanged from last year. Unit rates of usage were derived from National Fire Statistics (Scottish Government); reported two years in arrears, interviews with the Fire Service and by measuring hose flow rates. For this reporting year, Scottish Water contacted all Fire Services in Scotland to obtain incident data because it was not collected and reported centrally. The proposed UK database should be the source for future years if implemented.

As previously stated, 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 significantly improved the data quality and thereby the estimates. However, 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.

Standpipe licences demand: There was a reduction in licensed standpipes during the year. Standpipe demand is estimated based on the number of licensed standpipes, consumption by usage categories and an assumed 9m3/day for unclassified licences. The estimate is derived from an assumed usage per licensee. Acknowledging that estimates will always be uncertain and that any error will be relatively small compared with other categories, we recommend that Scottish Water completes sample metered usage surveys where appropriate to improve the accuracy of the unlicensed volume estimate (see A2.28 below) and confirm to the validity of the assumed usage per licensee. Until validation checks are initiated, this section of the water balance will remain very uncertain.

Waste Water Treatment Works: Metered usage has been interpolated from the demand at 72 WWTWs, representing 31% of the population equivalent (PE) by treatment type (Primary, Secondary and Tertiary) and PE banding.

Scottish Water Depots and offices demand: The estimate is based on Scottish Government official statistical usage per office worker for different categories of facilities. As for the previous return, only Scottish Water offices and direct staff numbers have been counted. Recognising that the total quantity (0.18Ml/d) is not significant in the overall water balance, we question why Scottish Water do not meter their offices and thereby quantify usage more accurately.

Scottish Water jetting demand: 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).

Animal troughs. There are three categories of water troughs, Metered and billed, Billed as a fixed charge, and unbilled. The metered troughs are included in the metered non-household numbers. All other troughs are not included in connection numbers.

An analysis of 1200 metered troughs concluded that the average trough usage is 558l/trough/day. Further work during 2008/09 concluded that unit usage was about 658 l/trough/day. Sample surveys in 8 rural DMAs in 2007/08 concluded that there were 21,468 unrecorded troughs and 7,828 billed troughs, a ratio of 2.7 unbilled troughs to each billed connection. Further surveys of 54 DMAs in 2008/09 found the ratio to be 0.45 unbilled troughs to each fixed charge billed trough. These surveys used geo-referencing and site visits to locate troughs by selected DMA. The surveys used data available at the time of business separation and was analysed by the Leakage Planning Section.

The 2009/10 fixed charge trough billing data have been supplied by Wholesale. The number of 'Fixed charge trough' records has been reduced by 1,983 to 11,616. The reasons for the reduction is currently not clear but is most linked to the work by Scottish Water, CMA and the LPs to resolve data anomalies relating to flags in the billing data associated with vacant properties. There is no evidence to suggest that the number of unbilled troughs should therefore also be reduced or held at the same as assessed for 2008/09. Scottish Water has adopted the latter approach. The impact of the reduction is of the order of 918 unbilled connections corresponding to about 0.6 Ml/d including supply pipe leakage.

The following table summarized the Unmetered Animal trough water demand including Fixed charge troughs and the estimated unbilled troughs.

Known and Unbilled Troughs - Not metered	Fixed charge Troughs	Unbilled Troughs	Total Known and Unbilled Troughs
No of troughs	11,616	6,146	19,745
Water delivered (Ml/d) (based on 658 l/trough/day)	7.65	4.05	11.70

Known and Unbilled Troughs - Not metered	Fixed charge Troughs	Unbilled Troughs	Total Known and Unbilled Troughs
USPL (Ml/d) (based on 34.39 l/conn./d)	0.40	0.21	0.61

The methodology which has not changed is considered reasonable, but we suggest that more work is required to improve the quality of the unbilled trough data and to ensure that all feeds to multiple troughs are metered.

As discussed in the AR09 report leakage from water trough 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 0.61 Ml/d may be underestimated. We recommend that in conjunction with the additional site surveys to improve unbilled trough numbers, that work is also undertaken to improve the estimates of UGSP leakage taking account of both length of pipe and its maintenance condition.

Temporary building connections. The methodology has been changed to reflect the number of new build properties connected to the network during the reporting year times an average volume of water used per property built. The number of new properties connected is recorded and reported by the Scottish Water New Connections Team (Line A1.11). The unit water usage per building ($33.8m^3$) is an estimated volume derived from UK Government and SG statistics. This methodology change resulting from the Water Balance audit reduced this component by about 0.4 Ml/d

Conclusions

As previously noted, 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.

Our overall conclusion is that Scottish Water has demonstrated ongoing progress towards improving the estimates of water taken legally unbilled. However there is uncertainty due to the numerous assumptions and where forecasting is based on relatively small sample sets. The Scottish Water reported volume is 4.4% of the water delivered. While generally water taken legally unbilled has been increasing in England and Wales as companies have been investigating their actual figures, the Scottish Water volume is double the percentage usage of the English and Welsh water and sewerage companies in 2007/08. 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 (Ml/d)	Estimated Consumption		
	2007/08	2008/09	2009/10
Occupied voids	0.80	0.83	0.76
Illegal standpipes	1.76	2.16	0.81
Fire hydrant misuse	0.51	0.48	1.32
Total	3.07	3.47	2.89

Overall consumption has reduced by 0.6Ml/d. Two of the three categories have reduced during AR10.

Scottish Water has assumed that 5% of 'void' properties will be occupied. Domestic 'void' properties in Scotland are reported as 3.9% of total domestic properties. This should be a reasonable figure as house sales are legally required to be notified in Scotland, a different practice from England and Wales. In one instance in England and Wales, when 'void' properties were closely monitored, a figure of 2.5% was obtained. However, this was a single case and we do not have any general figures. We believe that Scottish Water has made a reasonable assumption, although the derived demand should be regarded as uncertain.

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 estimated volume is derived based on the average volume used by licensed standpipes. Scottish Water puts the reduction in illegal standpipe numbers down to the current 'policing' policy. The estimated demand should be regarded as uncertain, because the estimate is based on recorded events only and historic flow rates.

The estimate for fire hydrant misuse is based on recorded numbers of vandalised fire hydrants and estimated incident duration and flow rate derived from PSP. There were 995 events in 2009/10 compared with 679 in 2008/09. Flow rates were derived from an analysis of 70 events (95 percentile sample); 0.48Ml/incident. The improved methodology reduces the uncertainty.

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

This year Scottish Water has assessed DSOU at 3.81 Ml/d an increase of 0.23 Ml/d since AR09. A comparison of the two figures is shown in the table below:

Item (Ml/d)	2007/08	2008/09	2009/10	Difference
Reservoir cleaning	0.62	0.32	0.38	+ 0.06
Planned flushing and swabbing	1.77	0.67	0.45	- 0.22

Item (Ml/d)	2007/08	2008/09	2009/10	Difference
Mains rehabilitation and new mains	0.99	1.12	1.19	+ 0.07
Burst repairs	0.50	0.52	0.52	-
No of burst repairs		*32,602*	*32,335*	*-267*
Water quality (customers)	0.89	0.83	1.15	+ 0.32
No of samples at customer premises		*14,200*	*19,433*	*5,233*
Water quality sampling	0.12	0.11	0.12	+ 0.01
Total	4.89	3.58	3.81	+ 0.23

The table illustrates that the most significant movement in DSOU is in water quality sampling at the customers premises where water quality related complaints investigated has increased by 37% in the year.

DSOU is made up of the same 6 categories as last year. Expressed as a percentage of distribution input (0.19%) the quantity is generally less than half that of water and sewerage companies in England and Wales (2007/08). This can be partially explained by Scottish Water's relatively high levels of leakage, where different utilities assign categories of non-revenue water and uncertainty in the estimates. 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. We therefore suggest that the overall volume for DSOU is likely to be comparable to other companies.

The methodologies and assumptions used for estimating reservoir cleaning, programmed flushing exercises and mains rehabilitation are the same as for the previous year. Numbers of events in each category will change each year in line with cleaning schedules and will include 'one off' events, e.g., network interventions to install equipment. Flow rates are based on historic studies of unit volumes, site surveys, interviews with operations personnel, shadowing exercises, data collection and using historic event records. All events are recorded by operations staff. Leakage Delivery now records and reports DSOU planned flushing and service reservoir cleaning monthly

Burst repairs, customer complaint water quality sampling and network sampling are all recorded on corporate databases. Historic flow rates are used to estimate usage.

As noted previously we suggest that Scottish Water implements a process for systematically recording event, duration and flow rate in order to improve the data on events and usage and thereby confidence in future estimates. We would like to see these assumptions better substantiated by surveys of actual practice, for example water used for flushing following customer complaints and mains flushing associated with mains renewal and new mains.

The sum of Water taken legally, illegally and DSOU is equivalent to 4.8% of the water delivered. The comparable percentage for the WASCS in England and Wales is approximately 2.8% of water delivered

Lines A2.10 and A2.11: Distribution input

Scottish Water only supplies water to customers within 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.

The availability of measured flow data from DI meters was 98% during the year. Daily values from individual TW and transfer meters are held in the Scottish Water DI data warehouse (Z-One).

Distribution input (DI) has been calculated from the measured flows recorded from data loggers linked to DI meters that are routinely downloaded (59.4%), telemetry flows (33.7%), manually read meters (4.5%) and from estimated data (2.4%) of which 18.4 Ml/d (0.9%) is a 'constant number'. Estimated data is derived from the year to data rolling average when the meter was operating supplemented by last years rolling average and estimating week in the previous year to derive a factor to modify the current year average. Scottish Water is aware that the estimation model does not work for small sites.

No adjustment is made for meter error. The meter verification programme, covering priority (circa. 80% by volume) 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 individual meter error is in the order of 5% to 10% with an overall error band of about 5.3%.

Flow data audit trails were followed for a number of meters and data for different months up to the monthly reported DI calculation.

Line A2.39 to A2.45 Sewage volumes

Scottish Water has applied a rate of 95% of water supplied as return flow to the sewers as set out in the WIC definition.

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

Scottish Water has undertaken a further review of WwTW drainage areas in AR10, to improve boundary lines with respect to sewered properties. Drained area boundaries for the small works have been tightened so that a small number of remoter properties have dropped out. Occupancy rates from local authority information have been used with an overall check against totals of population served. Revised area boundaries are prepared centrally and sent for checking by operational planners in the regions. This is an ongoing process, and there are now 100 out of 800 left to complete.

During the audit we examined a small number of individual WwTW drainage areas to confirm that boundaries are drawn to include all sewered properties, domestic and non-domestic, and that possible outliers are included or excluded as appropriate.

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 further review of sewage loads for individual WwTW drainage areas 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 that used in previous years. The key components of the load analysis are as follows:

- Resident population data are 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 from C-tax information for each council area and the calculated 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. Whilst the bed space numbers and usage at an individual property could be significantly different from the average, affecting the quality of the allocation to an individual works, the overall assessment remains reasonable. Scottish Water reported anecdotal evidence that urban families may spend significant periods visiting relatives in remoter areas. The effect on an individual WwTW may be significant as remote works are often very small but Scottish Water assumes that the overall effect on return figures is unlikely to be significant.

- 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. Where the spatial referencing of individual discharges results in discharges being mapped outside the catchment boundaries, these are identified and allocated individually. The accuracy of the allocation of loads to individual works might be poor because drainage areas are small and so vulnerable to extremes of customer variability. However, in aggregate the use of averages provides reasonable assurance in return figures.

- Inaccuracies in estimating individual loads to particular WwTW drainage areas may produce inaccuracies for those works figures but, in aggregate, the loads assessed for the return are reasonable. The rate of return of water to sewerage from non-domestic properties is 95%. The strength of this sewage is assumed to be the same as domestic (300 mg/litre).

- Trade effluent volumes and loads in AR10 are based on CMA data, whereas in AR09 Scottish Water had made an independent assessment based on Draft Business Plan information. Where a trader is served for part of a year, the load is annualised from the number of days at charge, which technique tends to overestimate the quantities. Scottish Water intends to stop this technique in AR11, and we commend the proposal. Separate assessments are made of BOD load and COD load based on sample test results. The reported quantities are based on settled 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 settled COD to unsettled concentrations. The daily trade effluent load is the annual load averaged over 365 days. In some catchments trade effluent may be discharged over a working week or be subject to seasonal peaks, resulting in a higher daily load on individual treatment works than the reported average implies. Trade effluent represents an estimated 20% of the total load discharged to sewer (including PPP works). Trade effluent loads are based on the measured volumes from the CMA, and measured 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 0.23% of the total load in tonnes BOD discharged to sewer (including PPP works), a reduction on AR09. Septic tank operations were disrupted by icy conditions on roads and customers' properties in the winter of 2010.

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 6.543 g/L BOD based on sampled measurements in 2004-05.

During AR09 Scottish Water introduced remote electronic devices to control tanker movements. Consequently data for AR10 is directly entered to the Scottish Water database. The proprietary software package used to control tanker load movements, Gemini, is now integrated with IMS for handheld devices.

Records for septic tank and other tanker loads are separated from sludge movements and downloaded to a spreadsheet from Gemini. Volumes and dry solids are recorded per load. We also examined the spreadsheet calculation for private septic tank emptying.

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. We have examined changes in allocation between operational areas and identified anomalies were justified except for a small number of small WwTW misallocated in Ellipse between Tay and Don.

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

<u>Line A2.61 to 62 Sewage sludge disposal</u>

The reported sludge quantity is the total quantity disposed of including the sludge disposed from PPP works which is reported separately in Table E3 (not audited this year).

We 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. As in AR09, Scottish Water has assumed that the loss or conversions 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 Scottish Water 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, except at Galashiels, where Scottish Water staff fill a trailer until it is judged full enough. 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 or the company IMS. The TDS also records sludge use in agriculture for loading applications and repeat periods. Sludge return figures are therefore generated from corporate systems and are likely to be robust.

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 and 6: The total winter water population is 5,035,060, an increase of 33,404 since the previous return (0.67%). Growth during the year is comparable with the previous year.

Lines 2 and 7: The summer population is the winter population plus the tourist population from the peak month for properties connected to the water service. For 2009/010, summer population is estimated to be 5,259,770 (5,252,039 in 2008/09), an increase of about 7,731 (0.15%

compared with the winter population increase of 0.67%). The Report Year +1 Forecast is predicting a higher growth for next year, 20,160 (0.38%).

The Summer Population, Waste Water is calculated in the same way as for water, but only 63% of the population is connected to sewerage network (derived from spreadsheet of tourist property billing records)

Line 3: The population of unmeasured household properties is calculated by multiplying the number of households with water by the Scottish Water calculated occupancy rate and is reported as 4,942,846 which is an increase of 0.67% from the previous return.

Line 4: The population of measured households is calculated from the number of measured domestic properties from the CMA Central Systems multiplied by the occupancy rate. The figure reported this year is 1,238 which is a reduction of 6.1% from the previous return. .

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

Line 8: Household population connected to the wastewater service (measured and unmeasured) is reported as 4,753,510 which is an increase of 26,760 (0.5%) from the previous return.

Line 9: The assumed percentage returned to sewer is 95%. Scottish Water states that this is an assumed industry standard.

Water balance

Lines 10, 11, 21 & 22 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%. DI is reported at 2,044 Ml/d reduced from 2008/09 by 99.29 Ml/d (-4.6%). The projected DI for next year assumes a further reduction of about 39 Ml/d primarily derived from reduced leakage (43.7 Ml/d).

Lines 12 & 25: Unmeasured household water delivered is 843.41 Ml/d, a reduction of 39 Ml/d from AR09 resulting from a reduction in estimate of Underground Supply Pipe Leakage of 48 Ml/d (from 56.04 l/prop/day to 35.64 l/prop/day for occupied households). The increase in pcc described above combined with population growth represents the difference.

There is a small difference between the pcc derived from the pcc Monitor to be used in the Water Balance and the calculated figure in line 25. The difference (0.41 l/h/d) results from the quantities used for USPL in occupied and void properties and how line 25 is calculated.

Lines 13 & 26: The domestic metered population is commented on in Line 4 above and in the commentary for Table A1. 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 during the period reflecting the reduction in number of connections. The PCC for metered domestic consumption derived from the volume delivered and Scottish national average household size is 176.41 including plumbing losses but excluding supply pipe losses, a reduction of 3.82 l/h/d (2.1%), similar to the calculated pcc for AR08.

There is a small difference between the pcc derived from the volume delivers used in the Water Balance and the calculated figure in line 26. The difference (0.28 l/h/d) results from the quantities used for USPL in occupied and void properties and is how line 26 is calculated.

Lines 14 & 23: There is a further significant reduction in the consumption of unmeasured non-domestic properties since the previous year (17.8 Ml/d or 51%), as a consequence of Scottish Water being able to use meter readings for the majority of billing accounts. A full commentary on this line item is included in the description of the methodology above.

Scottish Water forecasts an insignificant increase for Report Year +1. The non-household metering policy will result in a large change by 2012.

Line 23: Line 23 is calculated.

Line15 & 24: Measured non-household consumption comes from the CMA Central System 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 the figures published by Ofwat for English and Welsh water companies. While probably reasonable these may not fully reflect the situation in Scottish Water. Average consumptions have reduced by 0.7% to 427.91 Ml/d since last year.

Scottish Water forecasts a small increase (0.14%) for Report Year +1.

Line 24: Line 24 is calculated.

Line 16: This is the sum of lines 12 to 15.

Lines 17 & 27-29: A full commentary on these line items is included in the description of the methodology above.

Scottish Water forecasts that there will be a slight increase in Report Year +1 forecast in the Distribution System Operational Use component.

Line 18 & 30: Total reported 'Top Down' leakage has reduced by 85 Ml/d to 783.47 Ml/d. A full commentary on this line item is included in the description of the methodology above together with a breakdown of more significant changes in the water balance, and also in the Reporters Report titled Scottish Water's OPA Score 2008-09, May 2009.

Line 20: Scottish Water is reporting a reduction in the measured component of this item resulting in a reduction from AR09 of 2.90 Ml/d to 10.79 Ml/d. A full commentary on these line items is included in the description of the methodology above.

Lines 31 - 36: Underground Supply Pipe Losses are estimated to be 90.821 which is 50.416 Ml/d lower than in 2008/09. A full commentary on these line items is included in the description of the methodology above. The estimates for all property categories are lower than last year. At 35.1 which is comparable average in England and Wales for 2008/09 at 32.5 l/prop/d (range 7.3 to 53.9).

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

Bottom-up leakage

Lines 39 to 45: A full commentary on these line items is included in the description of the methodology above. In summary, for the second year, Scottish Water has been able to estimate Bottom Up leakage using DMA derived data from 2,795 DMAs covering 95.6% of the population with 85.7% operability. DMA leakage was estimated to be 664.37 Ml/d reduced by 69.23 Ml/d from the previous year. When trunk main and service reservioir leakage is added, Bottom Up leakage is 705.12 Ml/d, 70.79 Ml/d lower than last year. After applying the adjustment the Maximum Liklehood Estimate is 738.21 Ml/d, the reconciliation error being 3.8% of DI.

Scottish Water is forecasting a small reduction in Bottom Up leakage for Report Year + 1. We understand that the target for 2010/11 has not been set by WICS.

Sewage volumes

Line 46 The unmeasured household volume excludes the Supply Pipe leakage allowance. The assumed return to sewer factor of 95% water supplied is applied.

Line 47 This is a measured volume derived from CMA data.

Line 48 to 50: Measured non-household sewage volumes are up again in AR10 (22 ML/d or 16%), which is thought to reflect the drive to metering. There may be some transfer from trade effluent volume in Line 50, which is down, when very small trade effluent dischargers are removed from the charging system because charges are uneconomic to collect.

Line 51: Total sewage volume is 1.9% up on AR09 in contrast to a fall in water supplied, and may be attributed to changes in drainage boundary definition and in trade effluent activity.

Sewage Loads

Lines 53 to 66: The reported data refers to all loads discharged to sewer including that treated in PPP plant.

Lines 53: 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 a load assuming a per capita discharge of 60 g.BOD/day.

Line 54: 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.

Lines 55 & 56: The unmeasured and measured non-household loads are calculated from the estimated volumes of water from this type of supply (lines A2.41 and A2.42) multiplied by 300 mg.BOD/l.

Line 57: The trade effluent load is derived from individual consent monitoring records which are linked to treatment works. Scottish Water has used CMA data for AR10.

Line 58: The total discharged from primary services is calculated from lines 53 to 57 above. The reported figure therefore excludes load from non-resident population (see line 46).

Line 59 to 61: Taken from Scottish Water's Gemini records applying 6.543 g/L to the volumes removed from private and public septic tanks respectively.

Line 62: This is the sum of lines 51 to 54. It excludes loads from non-resident population because these are not included in line 46 and from sludge imports which are not included in lines 52 to 54.

Lines 63 & 64: The average COD and suspended solid figures are reported as 350mg/l and 250mg/l respectively. They are the nominal values used for determining wholesale trade effluent changes. These are unchanged from the previous return.

Line 65 & 66: 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 67: 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 62.

Lines 68 & 69: Scottish Water has changed operational practices and sludge disposal routes during AR10 as various parts of its plant have required maintenance. Some of these changes required increased use of storages. All figures are from the Gemini system.

Comments by Confidence Grade

Generally confidence grades remain unaltered from those used in the previous return. Subject to the comments below we accept Scottish Water's confidence grades.

Lines 1, 3-6 & 8: The CG for the lines are unchanged from the previous return at A2 and reflect the use of the latest sources of data.

Lines 2 and 7: We believe that Grade B2, unchanged from the previous return, is reasonable. The data are estimated derived from third party statistics and sources using a consistent methodology.

Line 9: The grade is unchanged from the previous return. Confidence grade A2 refers to an assumed industry norm which has not been validated for Scotland and could be high. We suggest that B3 may be more appropriate. However, we accept that the 95% figure was included in previous WICS reporting requirements.

Lines 10 and 11: The confidence grade B3 is unchanged from the previous year when it was raised based on the improving availability and quality of data and the implementation of a corporate database and the metering programme.

Lines 12, 25: The CG for line 12 is unchanged from last year reflecting the use of the Monitor to assess pcc. In AR09, the CG for line 25 was B3 reflecting the source and availability of data. For this return a full year of data were available for a statistically significant set of Monitor study areas. The CG has improved to B2. We accept the grades for the lines.

Lines 13 – 15, 24: The CMA Central System is the source of the data for these lines. There has been no change in calculation methodology, but there are issues with the accuracy of the data. The CGs for lines 13 and 15 remains at B to reflect the data source.

Line 14 was reduced last year to C5 to reflect the additional uncertainty in the data. The ongoing studies to improve unmeasured non-household numbers and quantities is reducing the uncertainty, but we agree that it is reasonable to keep the CG at C5 for this return.

Line 16: This is a calculation line. The grade for the line is unchanged from the previous return.

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. The CGs are unchanged from the previous return.

Line 18, 30, 39-45: As for previous years total leakage (Top Down) is estimated using the Integrated Flow Method. For this return the Bottom Up leakage has also been estimated based on DMA coverage reported above

Scottish Water has assigned CG of B4 to the output of the two leakage estimates and B3 to the MLE and reconciliation lines. Given the closing error we accept the grade.

The CGs for trunk main (line 40) and service reservoir losses (line 41) remain C4, reflecting the basis of the calculations and assumptions used.

Line 19: The water balance closing error is 3.8% of DI. For AR09 uncertainty was reduced for a number of the larger components of the Water Balance (DI and PCC). For this return the data derived from the DMAs is improved and better managed. We agree with the confidence grade B3 which is unchanged from last year.

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

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

Line 26: This line is linked to Line 15 with confidence grade B3.

Lines 31 to 36: The CG for these lines is unchanged from previous returns, C3. We accept the grade proposed

Lines 37 and 38: The volumes are estimated using assumed percentage meter errors based on Ofwat reported figures for the previous reporting period. The grades for the lines are unchanged from the previous return

Lines 46 to 67: 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. However, all the proposed confidence grades are unchanged from AR09.

All sewage return figures are derived from corporate data systems or external information from C-tax, the CMA and other published sources such as Visit Scotland figures. Data is allocated to WwTW level and recombined with known data about transfers between works for the return. The spreadsheets are necessarily complex but checks are carried out by reference to overall population data to minimise accidental data loss or gain. We believe that the return figures are robust within the confidence grades claimed which we believe to be reasonable.

The confidence grades for Report Year +1 Forecast are reasonable. Grades relating to data derived from third parties (CMA, WIC4 etc) are reduced by one level to reflect that it is a forecast. For the majority of water balance related lines the same CG has been use for the Year +1 estimates inferring that the same methodology and assumptions will be used for AR11.

5. SECTION B: OUTPUTS TO CUSTOMERS

5.1 Overview

Section B gives information on customer services including low pressure, interruptions, sewer flooding, 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

- We have audited data and the methodology for assessing properties at risk of receiving low pressure, the checks carried out before properties are added to the register and the checks carried out to prove that properties receive and continue to receive adequate pressure after improvement work is carried out.

- We have checked examples and substantiated procedures for the removal of properties following operational and capital solutions, properties within 10.5 metres of a service reservoir, properties excluded and other register changes. We have checked and substantiated lines B2.2 – 2.10 by reference to the base data.

- Scottish Water continues to improve both processes and the quality of the data held on properties receiving low pressure and all site data are now collected using hand-held devices

- During the year Scottish Water has eliminated by means of pressure logging all property numbers inherited from predecessor organisations which had no addresses. The investigations resulted in the discovery of a significant number of new low-pressure properties.

- Information on properties receiving low pressure is held in Scottish Water's corporate data repository (CDR), supported by its customer contact system PROMISE. All property numbers contained on the CDR are address-specific and have been subject to data cleansing and checking by pressure logging.

- New pressure problems are identified from customer complaints and investigations in connection with investment projects and operational changes and added to the CDR after investigation and pressure logging.

- Scottish Water 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 CDR is therefore a realistic statement of Scottish Water's position for its low pressure properties, recognising that there will continue to be a low incidence of new discoveries.

- A 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 782 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. The number has reduced during the year due to investment projects.

- The number of properties at risk of low pressure has decreased in the report year from 2974 to 2496. The main movements are additions due to better information (1772) and removals due to better information (1188). 998 properties were removed due to operational changes and 64 due to asset improvement. No properties were added due to operational changes or asset deterioration.

Scope of the audit

During the audit we reviewed:

- Sources of data on properties receiving pressure or flow below the reference level
- The methodology for compiling the table, including rules for adding or removing properties
- Progress on identifying the addresses of inherited non address-specific low-pressure properties
- Progress on data-cleansing the register
- The situation concerning long and shared communication pipes
- The assessment of the number of properties affected and excluded
- The methodology for carrying out pressure logging investigations
- Changes in numbers reported from the AR09
- Confidence grades

We also audited each line of the table to confirm the audit trail back to the base data and reviewed sample incidents with particular reference to pressure logging before and after the incident. The audit was carried out by interviewing members of Scottish Water staff responsible for the compilation of the tables and with direct, unrestricted access to data held on Scottish Water information systems.

Comments on Methodology

There have been no substantial changes in methodology, compared with AR09. However some further improvements have been made. The methodology includes further checks on connectivity to identify private supplies or properties not connected to the main in question. These checks are both site and office based. All data returns from site are now made using handheld devices which communicate directly with corporate data systems. All property numbers held on the original spreadsheet with unknown addresses have been investigated and eliminated from the data.

Data on low-pressure properties are now held entirely in the corporate data repository (CDR) and data are abstracted from the CDR database into a spreadsheet to produce the data in Table lines B2.2 – B2.10. Information in the CDR consists mainly of data transferred from the previous tactical application. This was originally compiled from the information held by the three predecessor water authorities, subsequently cleansed and checked by pressure-logging. The CDR also includes cleansed data originating from the previous spreadsheet of property numbers believed to experience low pressure, but without addresses. The CDR data are now entirely address-specific and the CDR is designed so that no property can be added to the register unless an address is supplied. The configuration of the CDR also prevents the removal of part-clusters of low-pressure problems in the event of a staged solution within a project. Properties can only be removed in whole clusters following the completion of all of the work in a project.

The previous standalone spreadsheet held property numbers inherited from predecessor organisations in specified water supply zones, but without property addresses. 322 properties were included, spread across 125 water supply zones, some of which had as few as one property number within them. Scottish Water has devoted significant effort to this issue and all of these zones were investigated using pressure logging during 2009-10. Investigations used a standard methodology which employed a total head method to identify potential clusters, followed by targeted logging to confirm properties actually affected. As a result of this work a small number of properties were removed from the register but a much larger number of linked properties added. This is the main reason for the increase in additions due to better information during AR10.

This analysis has achieved Scottish Water's objective that only the CDR will be used in future. It has a well–established flow-charted methodology and systems in place to capture, identify and analyse newly-reported low-pressure incidents.

Additions to the register arise from customer contacts, after verification, as a result of pressure-logging checks and checks made during investigations for proposed projects and due to operational logging. Customer contacts are sifted by the call handler using a question-tree. During the course of calls, operators have access to records of known work in the relevant DMA. All low-pressure complaints are recorded on the customer-contact system 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.

Following the customer's call, a Network Service Operator (NSO) carries out a Stage 1 investigation, visiting the location and collecting information using a hand-held recorder. The previous system of paper returns has been superseded and all returns now use handheld devices as part of the Information Management System (IMS) process. The inspector measures flow and pressure at the customer's tap and collects information on other properties affected. If the Stage 1 investigation confirms low pressure, a further Stage 2 investigation is carried out by a Network Analyst, who will check connectivity and carry out pressure logging and pressure contouring to determine pressures and the number of properties likely to be affected. Pressure modelling is not used as available models are not sufficiently reliable or up-to-date and do not offer adequate coverage. If warranted, properties are added to the register at this stage and operational or capital solutions proposed.

Operational solutions usually involve re-valving, rezoning or pump replacement, which generally requires some moderate capital expenditure. Capital solutions generally involve network strengthening. Further pressure-logging will often be carried out to determine the necessary extent of the work. After the necessary work has been carried out to provide adequate pressure, further pressure-logging is carried out to confirm pressures, augmented by customer contacts. No properties are removed without a successful outcome to pressure-logging investigations and further logging is carried out within twelve months, during the summer months, to confirm that pressures remain acceptable. Properties are not 'timed-out' from the register in the event that no further complaints are forthcoming.

In addition to the above process for adding, resolving and removing new pressure problems, data cleansing of the existing register of pressure problems has continued, focussing first on those water supply zones having the greatest number of identified low-pressure problems. Data cleansing was described in our report on the AR07 audit and has continued using the same methods. Briefly these comprise the following:

For the water supply zone under investigation, pressure logging is carried out over a two week period. Corporate GIS data are used along with digital terrain mapping to determine if properties suffered low pressure during the survey period. Pressures are measured by logger, the minimum pressure is noted and a calculation is carried out using the digital terrain model to calculate the pressure at each property assigned to that logger. Any properties which have a pressure calculated as being less than 15m (at the main) are 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 suffer low pressure are then entered onto the new corporate register with their full address details.

A surrogate reference level of 15m at the distribution main is used. Where low pressure is substantiated and the property is well above the main or the communication pipe is long, incidents are considered on their merits and Scottish Water may take steps to raise pressure at the boundary box to the surrogate level. No allowance is made for long service pipes or multiple properties fed from a common service, so long as the pressure at the boundary box is at the surrogate level or above.

The register does not identify whether a property has a long communication pipe or is one of a number of properties served from a common service. It is estimated that up to 50% of properties in Scotland could have shared service pipes. Scottish Water's approach is to target water supply zones with low pressures and property-types likely to have shared services to establish the mains pressures needed to give adequate tap pressures.

It is Scottish Water's view that the target pressures at the main given in the Reporting Requirements for properties on shared services are impracticable and inconsistent with the need to manage pressures for leakage reduction, although for reporting purposes the figures given in the table would be used to categorise low pressure, supported by measurements at the customer's tap. Scottish Water does not have good data on pressure problems caused by shared services as these tend to be identified only in response to a complaint.

Scottish Water has not claimed any exemptions for properties where ground level (established using GIS and judged to be accurate to within 1.5m) is within 10.5m of the bottom water level of a service reservoir. Nor are exemptions claimed for abnormal demand or for short-duration incidents, as Scottish Water does not have in place the permanent pressure-logging infrastructure to be able to substantiate these. Scottish Water however plans to place permanent pressure loggers in the mains network to gather data on this issue.

Exemptions are however claimed for planned maintenance and one-off incidents, these being identified either by the call-centre or by the inspector following investigation. Exemptions are also claimed for properties discovered to be connected to private rather than public supplies.

Conclusions

During the audit we audited a number of examples to ensure that the methodology had been followed.

Removal of Non-address- specific Properties from the Standalone Spreadsheet

We audited one example, selected at random, of properties shown on the previous standalone spreadsheet where no addresses were known. This referred to 2 property numbers in the Daviot-Loanhead water supply zone with unknown addresses. The Stage 2 investigation report was examined and the results of logging seen. These substantiated low pressures and it was confirmed by contour modelling that these affected 28 properties, which were subsequently added to the register as additions due to better information.

Checks on Operational Solutions

Two examples were selected at random for audit. These were incidents in the Ellon Low Level and Banchory water supply zones. The results of Stage 2 investigations were examined and in both cases seen to have reports prepared in the standard format, including logging locations, pre-and post-solution logging data and inferred pressures. In both cases properties were rezoned to improve pressures. After the work had been carried out pressure checks were carried out to confirm pressures at the main and inferred at the properties. These checks were repeated during the following summer. The results of pressure logging confirmed that pre-existing pressures were low and that pressures after improvement work were well above the reference level.

Checks on Capital Solutions

Two examples were selected at random for audit. These were incidents in the Craigbeath and Auchtermuchty water supply zones. Stage 2 investigation reports were examined and in both cases seen to include logging locations, pre-and post-solution logging data and inferred pressures. In both cases properties a service reservoir outlet main was reinforced to improve pressures. After the work had been carried out pressure checks were carried out to confirm pressures at the main and inferred at the properties. These checks were repeated during the following summer. The results of pressure logging confirmed that pre-existing pressures were low and that pressures after improvement work were well above the reference level.

Checks on Properties Within 10.5 metres of a Service Reservoir Bottom-Water Level

Two examples were selected at random for audit. These were close to Lochgelly Spion Kop SR (affecting 193 properties) and Killiecrankie SR (affecting 1 property). The Stage 2 investigation report was examined and the results of logging seen. These substantiated low pressures and the numbers of properties affected were confirmed by contour modelling.

Checks on Properties Excluded From the Register

1768 properties experiencing low pressure were excluded from the register during the year. These comprised 1113 exclusions due to one-off incidents such as work on the network and 673 which were demonstrated to be connected to private supplies. We examined the list of 95 properties excluded during September. This was seen to be address-specific and to list the number of properties affected in each case. One incident was selected at random for examination and the incident report seen. This was a case where temporary low pressure was caused by work on the nearby network. The customer confirmed that pressure had been restored the next day and the incident was logged as a one-off incident.

Checks on Other Register Changes

Two examples of changes to the register during the year were reviewed and the results of investigations seen. The first was at Peninver where 12 properties were removed form the register following an investigation which demonstrated that the properties concerned were connected to a private supply rather than public mains. The second was at Inverbervie, where 12 properties were added to the register after pressure logging demonstrated low pressures. In both cases Scottish Water's assessment was substantiated by the investigation.

Compilation of Table B2.2 –B2.10

The spreadsheet abstracted from the low pressure register on the CDR was examined and in every case the Table B2 line was substantiated.

We have concluded from our audit that Scottish Water has robust systems in place to record and assess incidents of low pressure. The methods used by Scottish Water are as described to us at the audit and in their Commentary and all assumptions have been disclosed. Scottish Water has not used sampling techniques to establish property numbers experiencing low pressure, although it has used extrapolation from measured pressures at points in the network by pressure-contouring to estimate the number of properties affected. This ignores the effect of communication and supply pipe head-losses but sufficient logging points appear to be used to minimise this effect. Property numbers without addresses have been eliminated during the year and all properties listed are all address-specific. The checks we have made on the data and methodology are covered above. Comments by line and on confidence grades are given below.

Comments by Line

Line 1:	This line is brought forward from Line A1.10. Comments are given in our commentary on Table A1.
Line 2:	The figure of 2974 properties below reference level was carried forward from last year's return.
Line 3:	Comprises additions due to better information from customer complaints, operational and OPA Action plan logging studies, DOMS investigations and investigations in conjunction with investment projects. This year's figure of 1772 is a significant increase compared with 2008-9 and the majority of this rise is made up of properties added following investigations into zones where property numbers were recorded with no addresses.
Lines 4 & 5:	No properties are now recorded as receiving low pressure due to asset deterioration or operational changes. This reflects improving management of the network, for example during pressure management work.

Line 6: 1188 properties were removed due to better information, identified from investigations into zones where property numbers were recorded with no addresses, DOMS investigations, information from Operations and information from investment projects. This compares with 1648 properties removed last year. In Scottish Water's view the number of removals due to better information is reducing each year because the network is becoming better understood.

Line 7: Removals because of asset investment are reduced compared with last year as there are fewer pressure projects in the final year of the investment period and an increased emphasis on operational solutions.

Line 8: Removals due to operational changes have reduced compared with last year and in Scottish Water's view are likely to continue to reduce as the number of problems approaches the base level.

Line 9: This is a calculated field showing the balance of 2496 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. The 1860 figure reported is reduced from up on last year's figure of 2086, but includes 782 properties which are within 10.5 metres of the bottom water level of a service reservoir. Numbers have reduced due to investment projects, but many are likely to remain on the register.

Comments on Confidence Grades

We believe that the continuing work carried out by Scottish Water is resulting in continuing improvements in its DG2 register. All property numbers without addresses have now been investigated and a comprehensive system is in place to identify, analyse and record low–pressure problems.

Line 1: This line is brought forward from Line A1.10. Comments are given in our commentary on Table A1.

Lines 2 & 3: These lines contain elements of historic information and we support a continuing confidence grade of B3.

Lines 4 & 5: We support a grade of BX for these lines, reflecting a small possibility that properties suffering low pressure due to asset deterioration or operational changes could be missed.

Lines 6 –8; We support an improved grade of A2 for these lines, reflecting the comprehensive process for investigation of low pressure problems and the removal of all property numbers without addresses.

Line 9: This is a calculated line and the confidence grade reflects the differing confidence grades of the elements of the calculation.

Line 10; We support the assessed grade of B3 for this line, reflecting the possibility that further low-pressure properties exist but are not reported.

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

Introduction

Key points:

- We have concluded from our audit that the methods used by Scottish Water are as described to us at the audit and in their Commentary. Scottish Water has not used sampling techniques to establish property numbers experiencing interruptions. The data are complete as submitted and the reported figures are confirmed.

- We have audited data and the methodology for recording properties subject to supply interruptions, the checks carried out before properties are added to the register, measures carried out to restore supply and the methods used to confirm the duration of the interruption and the number of properties affected. We have checked sample incident records and reconciled sample data with the base data.

- We have reviewed information on a number of incidents to check that data are recorded and the methodology is followed for incident durations, incident causes, incidents caused by third parties, planned interruptions which overrun, intermittent incidents and large incidents.

- The IMS process, where operatives enter data on handheld devices is used across the whole of Scotland. This includes "forced validation" to ensure completion of required data on hand-helds for reporting purposes. This reduces the incidence of missing data and data are automatically downloaded onto the corporate data repository (CDR), reducing the possibility of human error. In the report year use of IMS has increased, with only 10% of incidents now being reported using paper-based systems.

- The start of an incident is either when the operator turns a valve to cut off flow for a planned interruption or the time when a customer phones in to report a lack of water for an unplanned interruption, provided that the interruption is subsequently confirmed as being valid and Scottish Water's responsibility. The end of the interruption is when Scottish Water turns a valve to restore supply. This is not necessarily the time at which supply will be restored at the tap. This approach is consistent with our experience in England but this may not be universal.

- The incident duration for some properties will be overstated because they only become affected when a valve is turned to effect a repair. This may be some time after the time the first property is affected. The second 'water-off' time is not recorded and this results in an overstated incident duration for some properties.

- The causes of incidents are not always recorded, including those claimed to have been caused by third parties.

- Analysis of planned interruptions which overran shows that in two cases work started too late to allow completion in the warned window. In other cases data errors indicated an overrun when in practice this may not have been the case.

- 25698 properties were affected by just five large incidents where delays were caused by difficulties in obtaining plant, fittings or access or difficulties with the initial repair.

- The CDR is now the sole source of data held on interruptions, the former use of spreadsheets having been discontinued. The addresses of properties affected are not retained.

- The number of properties affected by planned interruptions has decreased since last year due to a reduction in rehabilitation work in the network. The number of properties affected by short unplanned interruptions has reduced while numbers affected by longer incidents remain broadly similar. Properties affected by planned interruptions overrunning have increased.

- Scottish Water continues to improve both processes and the quality of the data held on properties affected by supply interruptions. Due to organisational change, from October 2009 validation reports and root cause analyses were only prepared for larger incidents. This results in a small reduction of confidence in data for smaller incidents. This is counteracted by the increased use of hand-held technology by operators with the result that in the report year, data on 90% of incidents was provided by IMS download from operators on site, a significant increase from the 54% recorded for 2008-9.

Scope of the Audit

During the audit we reviewed:

- Sources of data on properties receiving interruptions to supply
- The capture of data on interruptions from customer contacts
- The investigation and resolution of incidents on site, including data capture
- The assessment of water-off and water-on times and the number of properties affected
- The methodology for compiling the table, including rules for adding or removing properties
- Checks carried out by Scottish Water to ensure data quality
- Changes in numbers reported from the AR09
- Confidence grades

We also reviewed a number of data returns from site investigation of incidents, data validation reports and root cause analyses for interruption incidents. We audited each line of the table to confirm the audit trail back to the base data.

The audit was carried out by interviewing members of Scottish Water's staff responsible for the compilation of the tables and with direct, unrestricted access to data held on Scottish Water information systems.

Comments on Methodology

General

There have been no significant changes in data sources or methodology for dealing with and recording interruptions to supply, compared with AR09. Procedures and data collection are the same for both planned and unplanned interruptions. Planned incidents are those where at least 48 hours notice of the interruption is given to the customer. Any interruption where less than 48 hours notice is given is counted as unplanned, even if it was scheduled. In addition any planned incident which overruns the warned duration is also counted as unplanned. Hand-held devices used by operators record the time and duration warned, but paper records do not.

Planned incidents begin when the network system operator turns the valve to cut the supply and the time is recorded by the operator, either on a hand-held device or a paper form. Planned incidents end when the operator turns the valve to restore the supply and the time is recorded either on the hand-held device or on a paper form. This time is not necessarily the time at which supply returns to the tap. At the margins of the network or where a service reservoir needs to refill after a lengthy incident there may be some delay before the customer receives a full supply. However this appears to be the only practicable measure for the end of the incident. This approach is consistent with our experience elsewhere.

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, only the work location or the address of the property which made the initial complaint being recorded. Scottish Water is understood to be considering a project which will allow the retention of the addresses of all properties affected by interruptions to supply to allow the reimbursement of customers affected in conjunction with its Price Promise initiative.

Unplanned incidents begin when a customer phones in to complain of a lack of supply, provided that the incident is subsequently verified by Scottish Water as being genuine and their responsibility. The telephone operator has access to information on ongoing work in the network and also to GIS and records details, including the time, on the PROMISE system. A work order is then raised in Ellipse. In the first instance a Network Service Operator (NSO) will go out and determine what the problem is and what needs to be done. They will also determine if the customer has lost water supply due to the actions of Scottish Water or due to those of a third party. They will phone back to the Operations Management Centre (OMC) where a further 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 to investigate they are required 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 requires that the interruption sheet cannot be opened until this form has been completed.

It will usually be necessary to turn a valve and interrupt the supply completely to effect a repair, which may extend the number of properties affected beyond the original number. The second 'water-off' time is not recorded and this results in an overstated incident duration for some properties. When the repair is complete the supply is restored. The end of an unplanned incident is recorded as for a planned incident above. In some cases the interruption may be found to be restricted to a problem on private pipework, for example a service pipe blockage affecting a single property.

If it is necessary to turn off supplies to effect a repair, the interruption is still counted for the purposes of the table, even if the cause of the interruption was not Scottish Water's responsibility. Where repairs can be done under pressure and the supply is not cut off this is not considered to be an interruption. If a second interruption occurs just after one in the same area has been closed this is counted as a new interruption for reporting purposes.

Data Capture and Storage

The Integrated Mobile Solution (IMS) process, which uses handheld devices to directly enter data, is operational across the whole of Scotland for Scottish Water staff, but not contractors. IMS data are entered into the corporate data repository (CDR) by automatic daily electronic download. Where there is no signal, hand-held recorders hold data until such time as a signal is available for an automatic download. Use of the IMS system is not universal. Data still come into the database from Scottish Water contractors using handwritten forms and paper forms are also used in some locations where there are signal and connectivity issues. Scottish Water has been working to increase the acceptance of hand-held technology by operators and in the report year data on 90% of incidents was provided by IMS download from operators on site, a significant increase from the 54% recorded for 2008-9.

Data from hand-held recorders is inherently more reliable. It is entered on site where site information is readily available. Certain data fields are mandatory and jobs cannot be closed, or staff move onto their next job until certain sections are completed ('forced validation'). Hand-held recorders provide access to GIS and data are automatically downloaded without manual intervention. Manually-entered data are potentially less reliable than IMS data because they may be entered later away from the site, some data may be missing and data are manually entered into the corporate data repository. 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.

Use of Handheld Devices

For planned work, the interruptions sheet on the handheld device contains data regarding what is planned, including:

- A description of the planned work.
- Planned start date and time and priority.
- A health and safety risk assessment which must 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 showing 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 to be done in the future.
- The DOMS assessment, which must be completed. Once this is complete a decision is made as to whether an interruption has occurred or not. If so 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 the water-on time. A second water-on time can be specified if the supply can be returned to a proportion of the properties by redirecting flows within the network. The second water-on time is for the actual repair when the remaining properties have supply returned. Times are 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 restored must be the same, otherwise the operator cannot move to the next stage.

Squad laptops have GIS, which can be used to determine the number of properties affected. For planned interruptions a desktop study is carried out using live GIS, customer complaint data from PROMISE, Perform Spatial-plus, telemetry information and the 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 numbers of properties and sensitive customers, such as hospitals are highlighted. For unplanned interruptions operators will make an estimate on the ground of the number of properties affected if this is small. Where larger numbers are affected, these will be checked by a desktop study, as above.

Data in the Corporate Data Repository

Standard queries are used to extract management information monthly from CDR and for the year-end reports and returns. Approximately 4000 data returns are made annually regarding interruptions and stored on the CDR. Data returns confirm the incident type, time off, time on (first) time on (second) and number of properties affected. The time off records the time that supply was reported to be lost by the customer, provided that this is confirmed by the Scottish Water NSO, or the time a valve was turned to effect a repair.

The data are currently presented monthly for OPA purposes to highlight exceptions and anomalies (such as planned interruptions which overrun). The figures reported in lines B2.11 to B2.25 are reported from the CDR which contains information on both planned and unplanned interruptions.

Data Analysis and Checking

For the first half of 2009-10 the procedure for data analysis and checking was as described in our commentary for AR09, as follows:

Where data mismatches were seen in monthly reports, exception reports were run and the data investigated to remove these. For all interruptions lasting over 6 hours an unplanned interruption to supply (UITS) validation report was produced. Durations and property numbers affected were checked by reference to DMA flow meters, customer contacts, pressure loggers, operator information and telemetry.

In all cases where an interruption exceeded 5 hours or affected more than 100 properties, Strategic Networks and CID carried out a root cause analysis (RCA). The purpose of the reports are to establish any patterns or trends, identify any changes needed to operational practice, to identify training and investment needs, or needs for further investigation. The reports summarise the burst history, established reasons for long interruptions and any delays to the restoration of supply and in some cases made recommendations for future action, including capital investment. Property numbers are checked and reconciled with meter records. An RCA summary report is produced annually to identify potential improvements in practice.

However due to organisational change and the transfer of responsibility for this activity to Customer Service Delivery (CSD), from October 2009 validation reports and root cause analyses were only prepared for larger incidents. Scottish Water is understood to be considering setting up an Interruptions to Supplies (ITS) team within CSD to reinstate these checks.

Conclusions

The figures reported in lines B2.11 to B2.25 are reported using Business Objects to extract data from the CDR which contains information on both planned and unplanned interruptions. As the majority of these data are now entered directly using hand-held devices the reliability of the table data is highly dependant on the quality of data entered on site.

It will usually be necessary to turn a valve and interrupt the supply completely to effect a repair, which may extend the number of properties affected beyond the original number. The second 'water-off' time is not recorded and this results in an overstated incident duration for some properties.

A number of incidents were audited to check the reliability of data and the application of the methodology.

Incident Durations

15 incidents were reviewed. Water-off and water-on times were always stated and times were given to the nearest five minutes in 12 cases and to the nearest minute in three cases. The incident durations appeared to be reasonable for the work detailed. Scottish Water was asked to produce a histogram showing the duration of all incidents in the year, which was examined. There appeared to be a slight drop in the histogram between 3 hours and 3 hours 30 minutes and between 6 hours and 6 hours 30 minutes. This could be caused by a focus among operators on the 3 and 6 hour duration criteria for incident monitoring for OPA purposes.

Causes of Interruptions

Data returned from site in the 15 incidents referred to above did not always make clear the cause of the interruption. In some cases the cause may be a burst on a private supply pipe and these incidents should not be reported in Table B2. It is possible therefore that the table contains a small overstatement of the number of incidents which are Scottish Water's responsibility.

Interruptions Caused by Third Parties

Three incidents were reviewed which were judged to have been caused by third parties. In each case the cause of the interruption was not stated, other than by means of a 'third-party' flag in the record.

Planned Interruptions Overrunning

Five such incidents in the year were reviewed. It was seen that in two cases work started well after the warned start time, leaving inadequate time to complete the work within the warned window. Such unplanned interruptions are avoidable. In 3 further cases data errors resulted in recorded water-off and water-on times being the same, automatically resulting in an indicated overrun. In a further check the water-off and water-on times of all planned interruptions overrunning were examined. These amounted to 18 interruptions, affecting 152 properties. It was seen that four incidents showed identical interruption start and finish times. The actual start and finish times were unknown, but it is likely that this has resulted in an overstatement of the number of properties affected by planned interruptions which overrun in lines B2.23 – 2.25.

Intermittent Incidents

Scottish Water's records were searched to find examples of further interruptions occurring within 24 hours of an original interruption. Very few were found and in the two cases which were located it was seen that the two incidents had been reported as separate incidents, as required by the Reporting Guidelines.

Large Incidents

In the report year five large incidents each affected more than 1000 properties, affecting 25698 properties in total. These incidents had a large impact on Table B2 and on OPA. In most but not all cases root cause analysis was carried out. In each case the duration of the incident was extended by difficulties in obtaining plant or fittings, in obtaining access or by difficulties with the initial repair. The root cause analysis for the Erskine interruption was examined. This affected 6890 properties for between 6 and 12 hours. The extent and duration of the incident was verified by reference to 14 pressure loggers in the network and the number of properties affected was assessed by reference to the number of properties in the DMA and the actual flows during the interruption in comparison with nightline flows.

Following these checks on individual incidents, the base data in the CDR were interrogated to reproduce table lines B2.11- 2.25 using Business Objects. In each case the table lines were substantiated.

We have concluded from our audit that the methods used by Scottish Water are as described to us at the audit and in their Commentary and that all assumptions have been disclosed. Scottish Water has not used sampling techniques to establish property numbers experiencing interruptions, and although the numbers of properties affected is established by analysis of the network rather than by checking from house to house, there is no reason to believe that this will lead to any significant error.

The data are complete as submitted and the reported figures are confirmed.

Comments by Line

Lines 11-14: Numbers of planned interruptions have decreased significantly since last year due to a continuing reduction in rehabilitation work on the system.

Lines 15-18: The number of short unplanned interruptions and the property numbers affected have reduced significantly since last year. The number of properties affected by longer interruptions is broadly the same as reported at AR09. The numbers in these lines are dominated by five large incidents. As incident causes are not always recorded it is possible that the reported numbers contain a small number of incidents which were actually caused by private supply pipe issues.

Lines 19-22: The number of interruptions caused by third parties is significantly reduced from last year. Scottish Water reports that the numbers of properties affected by third party incidents (which do not count towards OPA scores) are not as well verified as incidents which are Scottish Water's responsibility and the cause of the incident is generally not recorded.

Lines 23 to 25: The number of overruns of planned interruptions has risen this year. In our opinion the given figure of 122 properties may be overstated due to data errors.

Comments by Confidence Grades

Due to organisational change and the transfer of responsibility for the monitoring and management of interruptions to supply data, from October 2009 validation reports and root cause analyses were only prepared for larger incidents. This results in a small reduction of confidence in data for smaller incidents. However this is counteracted by the increased use of hand-held technology by operators with the result that in the report year, data on 90% of incidents was provided by IMS download from operators on site, a significant increase from the 54% recorded for 2008-9.

Scottish Water ascribes a confidence grade of A3 to all data on interruptions, except for zero entries. This is the same as last year. This appears reasonable given that all information is now held in corporate systems.

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 data, although this should not be a major problem as following a customer complaint the job is logged onto Ellipse and discrepancies are investigated. An increased use of handheld reporting and a reduction in reliance on paper reporting, together with more complete data returns from site on incident causes could lead to a further improvement in confidence grades in the future.

5.4 Table B3: Sewage Flooding

Commentary by REPORTER

Lines B3.1 to B3.12 – Annual Flooding

Introduction

Key Points

- We have audited data and the methodology for recording properties subject to internal flooding, the checks carried out before properties are recorded as suffering from internal flooding, measures taken during site checks and the methods used to confirm the location, sewer type and cause of flooding and the number of properties affected. We have checked and reconciled sample data with the base data.

- The PROMISE customer contact system, with the associated choke sheets and site checking by Scottish Water Performance Analysts, is the sole source of data on sewer flooding incidents. 85% of incidents are identified through customer complaints, the remainder by Scottish Water staff but all are entered onto PROMISE.

- All incidents are investigated on site and operators record their conclusions on sewer type, the effect on the customer, cause, number of properties affected and whether exceptional weather is a factor. Where a group of properties is affected, the addresses of properties affected are not retained, other than that of the first contact. All incidents where hydraulic overloading is thought to be the cause are further investigated, using hydraulic modelling where appropriate.

- In AR10 for the first time Scottish Water has Water used weather radar data and the Flood Estimation Handbook to investigate incidents attributed to severe weather during the report year. As a result 8 incidents are reported at line B3.4. One example was checked, for a rainstorm in Dunbar. The resulting calculation gave a rainfall return period of once in 574 years for the kilometre square in which the flooding incident took place.

- The IMS process where operatives enter data on handheld devices is now universal. This includes "forced validation" to ensure completion of required data on handhelds for reporting purposes. This reduces the incidence of missing data and data are automatically downloaded onto corporate systems, reducing the possibility of human error.

- Scottish Water uses weekly checking routines using the "FMAP" process and monthly management reporting on sewer flooding incidents to improve its analysis and reporting of sewer flooding incidents. Effort has been concentrated on the reporting and analysis of internal flooding.

- Only incidents caused by overloading of, or incidents affecting, public sewers are recorded. Laterals are <u>not</u> included although more than half of floodings from other causes originate with from laterals.

- For the current year the proportion of missing data on sewer flooding incidents is very low and Scottish Water has not applied any uplift for missing data to the reported figures.

- Each of the lines in Table B3 lines was reconciled with the base data in the CDW. The data are complete as submitted and the reported figures are confirmed.

- We have concluded from our audit that the methods used by Scottish Water are appropriate to meet WICS reporting requirements and that all material assumptions have been disclosed. Scottish Water has not used sampling techniques to establish property numbers experiencing flooding and the numbers of properties affected are established by checking from house to house.

- With the elimination of uplift and improved checking routines, we support the claimed improved confidence grade of B2 for lines B3.2 – 3.6 and B3.8 –3.12. The assessed grade of C5 for line B3.4 reflects the very limited number of years of reliable data available.

Scope of the Audit

During the audit we reviewed:

- Sources of data on properties affected by flooding
- The capture of data on flooding from customer contacts
- The investigation and resolution of incidents on site, including data capture
- The assessment of the cause of flooding, sewer type, the number of properties affected and whether flooding was internal or external
- The definition of extreme rainfall events
- The methodology for compiling the table
- Checks carried out by Scottish Water to ensure data quality
- Changes in numbers reported from AR09
- Confidence grades

We also audited the numbers of investigations and choke forms and the decision process for determining flooding type, sewer type and cause. We checked data recorded for a sample of five incidents and audited each line of the table to confirm the audit trail back to the base data.

The audit was carried out by interviewing members of Scottish Water staff responsible for the compilation of the tables and with direct, unrestricted access to data held on Scottish Water information systems.

Comments on Methodology

The principal source of data on flooding incidents is customer contacts recorded on PROMISE and the subsequent investigation and resolution of complaints and incidents on site. 85% of incidents are initially identified by customers, while a further 15% are identified by Scottish Water's staff. All are recorded on PROMISE. Customer contact staff use a question tree to identify flooding incidents and clarify information regarding the incident.

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 reports automatically generate a clear choke task. Field staff cannot generate such a task unless it has first been logged on PROMISE. Where the flooding is reported as being internal, response is required within 4 hours. Where the flooding is reported as being external, no response time is set.

The incident is investigated and field staff record their conclusions by means of a resolution code, confirming details. The categorisation of internal or external flooding is confirmed by site staff, who use a guidance sheet, known as a Z-card, to aid definition. Other details confirmed on site include the type of sewer where the seat of the problem lay (which may be public, private or a lateral) and the effect on the customer (including internal or external flooding and backing up). The weather at the time is also recorded and an initial assessment is made of the cause. This distinguishes between incidents of flooding due to overloaded sewers (IFOS) and incidents due to other causes (IFOC). The number of properties affected is also assessed by customer interviews. For the first time in 2009-10 all data are recorded on handheld recorders. PROMISE is updated with this information, which may result in a revision to the assessed sewer type, customer effect or cause.

Sewers are defined as public if they serve more than one property, whatever their age or location. In accordance with the Reporting Requirements, flooding from laterals is excluded from the tables. This is correct, although it was noted that over half of sewer floodings from other causes arise from laterals.

Where the initial assessment of the flooding cause is overloading, this will be further investigated by Strategic Networks to verify this conclusion, including the use of CCTV and hydraulic modelling, if appropriate and available, reference to site staff, site notes, customers and the flooding history. Every case of internal flooding is subject to this further checking, whether initially thought to be due to overloading or to other causes. Where hydraulic inadequacy of a public sewer is confirmed an investment project will be raised and a potential solution defined.

A weekly routine is used where a list of the week's incidents is produced and reviewed on a spreadsheet using the FMAP process, with the outcomes being fed back into PROMISE. Data are downloaded from PROMISE monthly, using Business Objects to produce reports from the corporate data. Monthly reports are made to senior Scottish Water management and used to review and improve the process for handling incidents and recording data. The same process is used for the production of reports used in the compilation of the tables in the Annual Return.

Prior to AR09 Scottish Water performed a data uplift to compensate for missing data and assuming that numbers, types and causes for incidents with missing data were in the same proportions as for incidents with available data. Due to increased use of handheld recorders and the application of improved discipline to checking processes uplift is no longer applied.

Starting in the report year, every case of internal flooding due to overloaded sewers is reviewed to determine whether it results from extreme rainfall, using Hyrad Met Office weather radar data, backed up by actual rainfall measurements where available. This shows rainfall intensities at ten-minute intervals over kilometre squares. The return period of the rainfall is then assessed using the industry-standard Flood Estimation Handbook. Rainfall assessed as having a return period of ten years of more is defined as exceptional and this was deemed to be the case for eight incidents in 2009-10. In our view this review procedure represents a step forward, compared with previous practice, but has limitations for very localised or short duration rainfall and in areas where radar coverage is less good.

Conclusions

At the audit, sample base data were examined. The records of five flooding incidents were reviewed on PROMISE. In each case the resolution of sewer type, flooding cause and flooding location were seen to be consistent. In some cases the categorisation of internal and external flooding was seen to have been amended following investigation. Changes from internal to external and vice-versa were seen.

Scottish Water no longer applies a data uplift to compensate for missing data and takes the view that due to increased use of handheld recorders and the application of improved discipline to checking processes uplift is no longer required. To check the validity of this decision data presented by Scottish Water in the form of a decision tree, used to analyse and categorise incidents, were reviewed. The numbers given were reconciled with data held in PROMISE, by means of a Business Objects extract of the PROMISE data. From the data it was seen that there were no incomplete resolution codes, no unknown causes, no incomplete sewer types, and only two missing clear-choke forms in 1966 incidents. In our opinion, this justifies the discontinuance of uplift and brings the data accuracy within the claimed confidence grade.

Each of the lines in Table B3 lines was reconciled with the base data in the CDW. The data are complete as submitted and the reported figures are confirmed.

We have concluded from our audit that the methods used by Scottish Water are appropriate to meet WICS reporting requirements and that all material assumptions have been disclosed. Scottish Water has not used sampling techniques to establish property numbers experiencing flooding and the numbers of properties affected are established by checking from house to house.

Comments by Line

Line 1: The number of properties connected to the sewerage system is taken from Table A1, line 21. Comments can be found in our commentary on Table A1.

Lines 2 to 5: The number of flooding incidents due to overloaded sewers is reported from Scottish Water's monthly Internal Flooding due to Overloaded Sewers (IFOS) report, generated by interrogating PROMISE, and listing cause, location and type. It was noted that, although the addresses of affected properties must be known to staff carrying out field investigations, these are not recorded, other than the address of the first contact; only property numbers being retained. Figures for AR10 are similar to those on AR09. 106 properties were flooded in 58 incidents.

Line 4: Scottish Water reports 8 incidents attributed to severe weather during the report year. This compares with 14 in AR09. Scottish Water uses weather radar data and the flood estimation handbook. One example of a flooding incident assessed as being due to extreme weather was reviewed. The methodology described above was followed for a rainstorm in Dunbar. The resulting calculation gave rainfall return periods as high as once in 574 years for the kilometre square in which the flooding incident took place. This was therefore correctly identified as an exceptional weather event and included in the total at this line.

Lines 6 to 12: The number of flooding incidents due to other causes is reported from Scottish Water's monthly Internal Flooding due to Other Causes (IFOC) report, generated by interrogating PROMISE, which again lists cause, location and type. Numbers of incidents and properties area broadly similar to last year with 230 properties flooded in 156 incidents. The figures exclude floodings resulting from laterals.

Line 7: The number of properties flooded more than once in ten years due to other causes is reported as 29. Figures for this line are calculated from incidents reported under the current reporting regime only, as figures collected under the previous reporting arrangements are regarded as suspect. For AR09 there were only two years data available under the new regime, while for AR10 there are three. It is to be expected therefore that numbers against this line will continue to increase as further years data are added. As the database does not hold property addresses, it is difficult to know whether individual properties have been repeat-flooded. It is recommended that all addresses of flooded properties should also be retained in the database.

Comments by Confidence Grade

Lines 2 to 6 and 8 to12:

Given the improvements which have been made to reduce the proportion of missing data, increase the use of hand-held recorders and hold data on the corporate database, and taking into account the results of checks made on the data, we support the claimed confidence grade of B2 for these lines.

Line 7: We support the allocated grade of C5 for this line, which recognises the limited and incomplete data set available in this category.

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

Introduction

Key points:

- We have audited data and the methodology for identifying properties at risk of internal flooding, the investigation of incidents and assessment of flooding frequency, methods used to confirm the location, sewer type and cause of flooding and the number of properties affected. We have checked and reconciled sample data with the base data. The methods used are appropriate to meet WICS' Reporting Requirements.

- There have been no changes to the methodology, data sources or data-holding systems used for the at-risk register during the last year.

- The sewer flooding register is a Tactical Application deriving from PROMISE data. It is a property-specific list of properties at risk of flooding due to hydraulic overload of public sewers only. No extrapolation of property numbers has been used. The register is based on actual flooding and all property numbers are address-specific. The register includes information on flooded properties migrated from historic data as well as new information obtained from PROMISE. The register is used to produce the figures for the Annual Return directly.

- Flooding caused by lateral sewers is not included in the register. We recommend that WIC confirms whether flooding incidents and number of properties flooding due to defects on laterals should be included in future Annual Returns.

- No properties are removed from the register simply because flooding has not recurred for some time. Properties are only removed following an investment project or due to better information.

- No uplift has been applied to the numbers of incidents to account for missing data.

- Scottish Water has used weather radar data and the Flood Estimation Handbook to investigate incidents attributed to severe weather during the report year and substantiate extreme events. This check is now applied to all new cases of internal flooding.

- The average cost of investment solutions has been calculated on a project-by-project basis as required by the Reporting Requirements.

- The principal cause of removals is now authority action (142). The number of removals due to better information (7) has greatly reduced as the quality of data on the register improves. 94 properties were added to the register because of better information, including significant numbers in the 1 in 20 year risk category, where new flooding discoveries are now generally added and 21 properties have had their flooding frequency downgraded following sewer improvements.

- The confidence grades claimed by Scottish Water are supported.

Audit Process

During the audit we reviewed:

- Sources of data on properties affected by flooding.
- The capture of data on flooding from customer contacts.
- The investigation and resolution of incidents on site, including data capture.
- The assessment of the cause of flooding, sewer type, the number of properties affected and whether flooding was internal or external.
- Progress on cleansing inherited historical data.
- The assessment of flooding frequency.
- The methodology for compiling the table.
- Checks carried out by Scottish Water to ensure data quality.
- Changes in numbers reported from AR09.
- Confidence grades.

We also audited each line of the table to confirm the audit trail back to the base data.

The audit was carried out by interviewing members of Scottish Water staff responsible for the compilation of the tables and with direct, unrestricted access to data held on the Scottish Water network.

Comments on Methodology

The register of properties at risk of flooding, put in place in the 2005-06 report year, remains in use this year with no changes to the format of the database. It is kept in a Tactical Application as an Oracle database. Data on internal and external flooding are both kept in the single Tactical Application, but used to produce separate internal and external at-risk registers.

No change has taken place in the methodology for assessing at-risk properties. Only flooding arising from hydraulic inadequacy of public sewers is recorded. Laterals are not included, in accordance with the Reporting Requirements and we recommend that WICS confirms whether this is their intention.

The Tactical Application is a database which was originally populated with data from the predecessor authorities at the time of the formation of Scottish Water. Data from West of Scotland Water consisted of its at-risk register. That from East of Scotland Water had been derived from drainage area study modelling and information in the North of Scotland area was largely derived from records of GMS payments. However since its original compilation the original register has been substantially cleansed. Properties have also been added as a result of new incidents identified through the PROMISE system and by operational staff (as described in our comments on lines B3.2-12 above) together with properties identified as a result of design checks carried out for temporary and permanent investment projects and as a result of drainage area studies. This information is provided by operations or asset planners.

During the report year properties have only been removed from the register as a result of completed investment projects and better information following design checks carried out for temporary and permanent investment projects. The Tactical Application does not record where a hydraulic check has been carried out on a property.

The register is entirely property-specific. It contains no property numbers derived by extrapolation. The current at-risk numbers are based on pre-existing numbers for properties where no alleviation has been carried out, plus new reported flooding incidents occurring in the year. The information added to the flooding register is limited to flooding caused by overloaded sewers. This includes flooding incidents as a result of exceptional weather, the numbers of which are recorded in the table.

The Reporting Requirements call for Scottish Water to maintain both internal and external at-risk registers which should form a database of all properties which experience internal or external sewer flooding caused by hydraulic inadequacy. The registers 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. Incidents can cover more than one address and the incident table can detail the properties affected in an incident. The at-risk register does not include any properties affected by flooding arising from hydraulic overloading of a private drain or lateral, although this is thought to be uncommon.

Updates to the table arising from new incidents are carried out using the FMAP process. In this process information on flooding frequencies, and whether flooding was internal or external, is derived from customer contact interviews, backed up by modelling for internal flooding. Scottish Water state that around 80% of properties on the internal flooding at-risk register have been subject to hydraulic checks. In addition around 6000 door to door surveys were carried out during 2006 to determine whether properties on the register had ever suffered from internal flooding, the date of the flooding and to confirm exact addresses, although there was a significant level of non-response to these due to occupiers not being at home. This information was used to amend the information on the register and was the main reason for the rapidly reducing property numbers on the register in recent years.

Wherever investment projects are planned, customer interviews are carried out and this is also done for all incidents covered by the FMAP process. This results in the greatest cause of removals from the internal at-risk register, which is reclassification of flooding from internal to external.

When a property is first reported as being flooded by a customer and it has never been recorded as flooding before it is flagged in a holding category. Following the completion of an initial investigation which confirms the property has actually flooded it is put in the 1 in 20 year category if there is no evidence of previous flooding, or the 1 in 10 or 2 in 10 year categories if flooding is shown to have occurred before and depending on its frequency.

When a property is first added to the 1 in 10 year category Scottish Water does not currently review storm frequencies, undertake additional customer surveys or undertake hydraulic modelling to confirm that it has been correctly allocated. The situation in

England and Wales generally is that on first flooding properties are put in the 1 in 20 year register unless they are assessed as requiring to be put into another category.

Scottish Water does not currently have an internal audit process for the assessment of frequencies, but the Tactical Application records additions and removals, with the reasons, the date and the part making the change.

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.

The register is based on observed flooding rather than modelling, although properties may be added to the register following modelling if evidence is compelling, for example if adjacent properties are known to have flooded at the same time.

Removals from the register can be made due to a lack of observed flooding over a period of time for a property added as a result of modelling only, following the completion of an investment project resulting in a permanent solution or where an investigation demonstrates that the flooding was due to a cause other than hydraulic overloading. Properties are not removed following the completion of temporary solutions and no properties are 'timed-out' from the register, that is to say, removed because flooding has not recurred. The design storm return period used for investment projects is 30 years.

The register includes a small number of properties where flooding has not been confirmed by the customer, due to their unavailability. This may include a small number of cases where information was inherited from one of the predecessor authorities. No properties have been removed from the register as a result of a review of the impact of investment projects carried out in previous years.

Costs in lines B3.24 to B3.27 have for the first time in AR10 been calculated on a case-by-case basis and then aggregated in accordance with the Reporting Requirements.

To produce the Annual Return tables, at-risk numbers are generated by queries on the flooding register and manually checked and compared with data from last year. The database is then frozen and a copy retained for record.

We noted in our report on AR08 that Scottish Water appears to be approaching a steady state situation, where properties will be added to the flooding register at a similar rate to those removed as a result of sewerage investment. It is likely that the unit cost of alleviating flooding will rise. We therefore continue to recommend that Scottish Water reviews its methods for recording both internal and external flooding, so that the register is accurately maintained. The basis for each categorisation should be clearly supported.

Conclusions

At the audit the data were examined and for lines B3.13 - 3.23 the data in the table lines were reconciled with the base data in the Tactical Application. The data are complete as submitted and the reported figures are confirmed.

All property numbers examined were found to be address-specific and based on actual, observed flooding. Scottish Water has not used statistical methods or extrapolation to estimate numbers, other than including properties indicated to flood by modelling where flooding has not been recorded but the evidence is compelling (for example the observed flooding of adjacent properties). The numbers of properties affected are confirmed by checking from house to house.

We have concluded from our audit that the methods used by Scottish Water are appropriate to meet WICS reporting requirements and that all material assumptions have been disclosed. No properties where flooding has actually occurred are 'timed out' from the register simply because no further flooding has occurred.

We have checked and confirmed the numbers of properties in the addition and removal lines in the table. The minimum storm return period used for the design of alleviation projects is 30 years.

We have reviewed the calculation of problem-solving costs in lines B3.24 – 3.27. In previous years the average cost of investment projects was calculated from the total cost of the sewer flooding programme, divided by the number of properties alleviated. For AR10 costs have been calculated on a project-by-project basis before amalgamation, in line with the Reporting Requirements. The opex cost has also been calculated on a project-by-project basis before amalgamation. We noted that some of the opex costs assigned to measures appear nominal, although this is an improvement on AR09, when it was assumed that no opex costs applied to these solutions.

In our view, the at-risk register has been greatly improved in recent years. However, the base records continue to include some properties from the inherited records of the three predecessor authorities, which may not be complete or accurate. We recommend that Scottish Water continues to review these cases by customer contact and hydraulic modelling.

The process for identifying new flooded properties from PROMISE and confirming type, cause and extent has been improved, as described in the commentary on lines B3.2 - 3.12 above, and the proportion of incidents with missing data has been greatly reduced, giving improved confidence in the information which forms the basis of the at-risk register.

We 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

Numbers of properties in both the 2 in 10 and 1 in 10 categories have reduced in the report year. 142 properties were removed following investment projects and 7 due to better information. 94 properties were added because of better information arising from customer contacts or investigations in connection with drainage area studies and investment projects. No properties were added due to increased demand.

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. The reduction from the previous years return is mainly due to 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 due to investment projects.

Line 15: This is the sum of lines 3.13 and 3.14

Line 16: In previous years Scottish Water has reported this figure as zero. However this year 43 properties are reported which suffered flooding for the first time. This rise has occurred because Scottish Water is now following WICS guidance whereby new floodings are normally added to the 1 in 20 category (unless a higher frequency is justified). For previous Annual Return such new floodings were normally added to the 1 in 10 category. In addition 21 properties in Campbelltown were downgraded from 2 in 10 and 1 in 10 categories to the 1 in 20 category following the completion of investment projects.

Line 17: This line identifies properties where there has been no incident in the last 10 years. These are generally long-standing entries where there has been no reoccurrence but there is no justification for removal. The number reported (15) is similar to last year. These properties are being reviewed. It is believed that they may include some properties where the cause of the flooding has been removed by an investment project carried out some time ago, before the present procedures for removal were in place. They may also include flooding where the cause was 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. These generally entail the use of isolating valves with pumping. 158 are reported, a similar number to last year. This number was derived from the Tactical Application.

Line 19: This line consists of the balance remaining to be solved, deducting line 3.18 from line 3.15. The number reported has reduced from last year.

Line 20: This figure represents the outputs from Scottish Water's capital investment schemes reported as reaching their Beneficial Use state. The register does not record what the action was in each case. The number reported has continued to increase, compared with previous years.

Line 21: This line reflects cleansing of the historic data. The significant reduction in the figure reported from last year reflects the generally improving state of the information making up the register and indicates that few examples remain to be cleansed.

Line 22: Properties added due to better information includes all new flooding, however discovered. They include incidents from PROMISE and properties associated with investigations for investment projects and drainage area studies. The number has increased significantly from AR09.

Line 23: No properties are reported as flooding due to increased demand. This is because Scottish Water takes the view that it is funded to cater for demand arising from new development and that capacity is provided in advance of connection being allowed. From other audit work it is clear that hydraulic capacity is checked before connection is authorised, so flooding is unlikely to result. Changes in population and water use are generally small but this does not preclude the possibility of flooding incidents occurring for this reason in future.

Line 24: This line gives the average costs of all capital works identified as coming into beneficial use in the previous twelve months, calculated on a project by project basis. The cost per property is broadly similar to AR09. Cost has been calculated in line with Reporting Requirements.

Line 25: Scottish Water has for the first time this year identified opex costs relating to permanent solutions installed in the year. These have been identified on a project-by-project basis.

Line 26: This line gives the average costs relating to all temporary solutions in place. This has been calculated on a site-by-site basis and may be slightly understated as it does not appear to include the addition of Scottish Water overhead (2.5%) to Scottish Water Solutions costs. The unit cost is lower than that given in last years return.

Line 27: Scottish Water has not identified any opex costs relating to the temporary works. The most common such works are pumped non-return valves fitted to house connections, but in such cases the householder meets the cost of electricity.

Line 28: Scottish Water has stated this value as 253. This figure has not been audited.

Comments by Confidence Grade

Lines 13 to 27: Scottish Water has claimed a confidence grade of B2 for these lines, except for zero entries, where a grade of BX is proposed. Given the method of data-holding – in a Tactical Application with significant manual interpretation of data - and the uncertainties in data accuracy listed by line above, we support these grades.

5.5 Table B3a: Sewage – External Flooding

Commentary by REPORTER

Introduction

Key points:

- We have audited data and the methodology for recording properties subject to external flooding, the checks carried out before properties are recorded as suffering from external flooding, measures taken during site checks and the methods used to confirm the location, sewer type and cause of flooding and the number of properties affected. In each case the data in the table lines were reconciled with the base data in the CDW. The data are complete as submitted and the reported figures are confirmed.

- The methodology and data sources for external flooding incidents are the same as for internal flooding incidents. Reference should be made to our commentary on Table B3 for a full explanation. The PROMISE customer contact system is the key source of data on sewer flooding incidents, backed up by field investigations.

- The validation carried out for internal flooding is not carried for external flooding and there is a significant level of missing data. Confidence in the answers is therefore lower. A significant uplift is applied to the numbers of external flooding incidents reported due to both overloaded sewers and other causes. It follows that a significant proportion of the numbers reported are not location-specific. Confidence in the number of external flooding incidents is lower than that in internal flooding incidents.

- The proportion of missing or incomplete flooding causes and incomplete sewer types is reduced when compared with AR09 but there remains a significant level of missing data and, as in previous years, Scottish Water has applied an uplift to the numbers of incidents reported. Uplifts of +46.54% and +46.28% were applied to external flooding from overloaded sewers and from other causes, respectively. No such uplift is applied to the at-risk register for external flooding and it is likely that the register understates the number of areas at risk.

- Areas at risk of external flooding are not routinely added to the at-risk register because of the large numbers involved and the lack of verification. A small number of areas have been removed from the register as a result of improvements made to resolve internal flooding.

- 66% of clear-choke forms returned referred to laterals. As required by the Reporting Requirements, these are not included in Table B3a. We recommend that WICS confirms whether flooding incidents and number of properties flooding due to defects on laterals should be included in future Annual Returns.

- The assessment of severe weather for external flooding is based solely on the assessment made on site at the time of the incident and is not checked either by a desk study of by reference to Met Office rainfall records as is now done for all internal floodings.

- In our opinion the data collection methods used are appropriate to meet WICS reporting requirements and clearly set out in the methodology statement. However these are only sufficient to justify a comparatively low accuracy grade. Scottish Water has disclosed all assumptions used in the calculation of reported figures.

- Given the current difficulty of assessing the true numbers of properties at risk and the fact that checks have not been carried as for internal flooding we consider that confidence grades of B4 and BX suggested by Scottish Water are reasonable.

Scope of the Audit

During the audit we reviewed:

- Sources of data on properties affected by flooding.
- The capture of data on flooding from customer contacts.
- The investigation and resolution of incidents on site, including data capture.
- The assessment of the cause of flooding, sewer type, the number of properties affected and whether flooding was internal or external.
- Progress on cleansing historic data.
- The assessment of flooding frequency.
- The methodology for compiling the table.
- Checks carried out by Scottish Water to ensure data quality.
- Changes in numbers reported from AR09.
- Confidence grades.

We also audited the numbers of investigations and choke forms and the decision process for determining flooding type, sewer type and cause. We checked data recorded for sample incidents and audited each line of the table to confirm the audit trail back to the base data.

The audit was carried out by interviewing members of Scottish Water staff responsible for the compilation of the tables and with direct, unrestricted access to data held on Scottish Water information systems.

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

Comments on Methodology

Scottish Water's methodology for recording external flooding incidents is the same as that used for internal flooding and reference should be made to our commentary on Table B3, lines 1-12, above. Confirmation of whether flooding is internal or external is carried out as part of the process for investigating flooding incidents.

However the annual number of external flooding incidents is much greater than the number of internal flooding incidents and resource implications prevent these being investigated in the same way as internal incidents. External flooding is not considered in the calculation of OPA scores and no funding is available for the resolution of external flooding. For these reasons the level of validation carried out for internal flooding is not repeated for external flooding and confidence in the figures is therefore lower.

Conclusions

In the report year a total of 32284 customer contacts were received which customers related to sewer flooding. This number is very similar to the AR09 total. Of these, 15675 proved to relate to external flooding from public sewers and 4539 had no resolution code, a similar proportion to AR09. 15469 clear-choke requests were issued and of these 1964 had missing or incomplete flooding cause and 302 had incomplete sewer type recorded after investigation. The proportion of missing or incomplete flooding causes and incomplete sewer types is significantly reduced, compared with AR09 but this remains a significant level of missing data and as previously Scottish Water has applied an uplift to numbers of incidents reported.

The uplift is applied on the basis of the assumption that missing data falls into the cause, effect and sewer type categories in the same proportions as the known data. There is a greater proportion of known data for AR10 and uplifts of +46.54% and + 46.28% were applied to external flooding from overloaded sewers and from other causes, respectively. This percentage uplift is reduced from AR09 when the corresponding percentages were +77.11% and + 77.25%. The uplift percentages applied make a very material difference to reported totals.

In order to improve the quality and completeness of data on external flooding incidents, Scottish Water believes that the completion of choke forms should be made mandatory for external flooding and the procedures extended to cover contractors with the same rigour as its own staff.

It was noted that of the 14254 clear-choke forms returned 9377 (66%) referred to laterals. As required by the Reporting Requirements, these are not included in Table B3a.

The assessment of severe weather for external flooding is based solely on the assessment made on site at the time of the incident and is not checked either by a desk study or by reference to Met Office rainfall records. This could be done, using Hyrad Met Office data and the Flood Estimating Handbook as is now done for all internal floodings. However given the large number of incidents of external flooding, this would impose a heavy workload on Scottish Water.

Generally, investment projects are not promoted to resolve only external flooding. However one project was noted in AR10 at Craigie Place Galston, where storage and a surface water collector were installed solely to mitigate external flooding of a number of properties. In addition, some external flooding is alleviated by virtue of projects designed to alleviate internal flooding. Such projects are designed using a one in 30 year return period storm.

In the report year, the number of incidents is reported as being the same as the number of areas. However some inconsistency has been noted in samples reviewed in previous years. In principle a single restriction resulting in more than one flooding location (for example along an undulating road) should be counted as only one incident. However as investment is not targeted at external floodings and these do not form part of OPA assessment, no validation of data is carried out for external events. The completion of choke forms is mandatory, but there remains much information which cannot be collected on site without validation and the assessment of multiple flooding locations on site is heavily dependant on the judgement of the operator on site.

At the audit the data were examined and in each case the data in the table lines were reconciled with the base data in the CDW. The data are complete as submitted and the reported figures are confirmed.

We have concluded from our audit that the methods used by Scottish Water are appropriate to meet WICS reporting requirements and that all material assumptions have been disclosed.

In our opinion the data collection methods used are appropriate to meet WICS reporting requirements and clearly set out in the methodology statement. However these are only sufficient to justify a comparatively low accuracy grade.

Comments by Line

Lines 1 to 6: A total of 333 flooding incidents due to overloaded sewers was reported this year, significantly down from the 712 reported in AR09 caused by thunderstorms in July and August 2008.

Lines 7 to 10: It was noted that the numbers of incidents (lines 8-10) totals 5814, while the number of areas (line 7) is 5797. This is inconsistent with Scottish Water's policy of reporting the same number of incidents and areas. It has arisen because lines 8-10 count the number of service requests (choke forms) in the year and a small number of incidents have more than one form generated. The figures are determined as for flooding due to overloaded sewers, the cause being determined from the choke form.

Comments by Confidence Grade

Lines 1-12: Given the level of missing data and the high level of uplift applied, we consider that the confidence grade of B4 proposed by Scottish Water is reasonable.

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

Comments on Methodology

Scottish Water's methodology for compiling the at-risk register for external flooding is the same as that used for internal flooding and reference should be made to our commentary on Table B3, lines 13 - 27, above. Confirmation of whether flooding is internal or external is carried out as part of the process for investigating flooding incidents. Our comments on the recording of external flooding incidents in the section above (lines B3a.1-10) are also relevant to the compilation of the register.

Conclusions

The external flooding at-risk register contains many more areas than the internal register contains properties and a significant proportion of these are areas inherited from the predecessor authorities. Owing to resource demands these have not been checked and reviewed in the same way as the internal at-risk register and there is lower confidence in their accuracy. No hydraulic checks or door-to-door surveys have been carried out and these are only done for external areas where these are incidental to investigations for internal flooding. Some 1 in 10 and 2 in 10 risk properties remain in the register which do not have dates recorded.

Areas at risk of external flooding are not routinely added to the at-risk register because of the large numbers involved and the lack of verification. However a small number of areas have been removed from the register as a result of improvements made to resolve internal flooding, resulting in a small reduction in the number of areas at risk, compared with AR09.

Owing to known missing data on external flooding, as described in our comments on lines B3a.1-10 above, an uplift is applied to numbers of external flooding incidents. No such uplift is applied to the at-risk register for external flooding and this may indicate that the register understates the number of areas at risk.

Scottish Water accepts the need to improve the external at-risk register and cleanse large numbers of historical entries. No progress has yet been made on this issue but it is understood that this will be a Ministerial Objective for the Q&S3b investment period.

There appears to be some lack of clarity in the definition of an 'area' for the purposes of the external at-risk register. In principle a single restriction resulting in more than one flooding location (for example along an undulating road) should be counted as only one incident. However as investment is not targeted at external floodings and these do not form part of OPA assessment, no validation of data is carried out for external events. The completion of choke forms is mandatory, but there remains much information which cannot be collected on site without validation and the assessment of multiple flooding locations on site is heavily dependant on the judgement of the operator on site.

At the audit the data were examined and for lines B3.11 - 3.21 the data in the table lines were reconciled with the base data in the Tactical Application. The data are complete as submitted and the reported figures are confirmed.

No problem-solving costs are given in lines B3a.22, 23 or 25 as investment is not normally devoted to external flooding. However one such project was carried out in 2009-10 resulting in the cost stated at line B3a.24. It was assumed that no opex cost applied to this solution.

We have concluded from our audit that the methods used by Scottish Water are appropriate to meet WICS reporting requirements and that all material assumptions have been disclosed.

Given the difficulty of assessing the true numbers of properties at risk and the fact that checks have not been carried as for internal flooding we consider that a confidence grades of B4 and BX suggested by Scottish Water are reasonable.

Comments by Line

Lines 11-14: Numbers reported are broadly the same as last year reflecting the lack of updating of the external register.

Line 11: This line identifies the number of properties in the register that have had two or more reported external flooding incidents in the last ten 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 one reported external flooding incident in the last ten 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 13: Only 7 areas have been identified in this category, due to a lack of reliable supporting data. It is likely that there are in fact many more such areas.

Line 14: This line is the sum of lines 11 and 12.

Line 15: Areas listed in this line are those where action to alleviate internal flooding have also resulted in the alleviation of external flooding.

Line 16: No action is planned to resolve areas in this category, so this number remains similar to last year.

Line 17: The number of properties removed by company action represents the incidental outputs from capital investment schemes promoted to remove internal flooding.

Line 18: This line reflects external flooding removed as a result of investigations and better information from work directed at the analysis of internal flooding.

Line 19: This line comprises additions due to new incidents and additions arising from work directed at the analysis of internal flooding.

Line 20: No areas are reported as flooding due to increased demand. This is because Scottish Water takes the view that it is funded to cater for demand arising from new development and that capacity is provided in advance of connection being allowed. From other audit work it is clear that hydraulic capacity is checked before connection is authorised, so this is unlikely to occur. Changes in population and water use are generally small but this does not preclude the possibility of flooding incidents occurring for this reason in future.

Line 21: This line comprises reductions arising from work directed at the analysis of internal flooding.

Lines 22-25: One scheme was undertaken last year solely the alleviation of external flooding, resulting in the entry at line B3a.24. It was assumed that no opex cost would result.

Comments by Confidence Grade

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

5.6 Table B4: Customer Service

Commentary by REPORTER

Introduction

Since April 2008 Scottish Water has been split into two parts: Scottish Water and Business Stream. Along with other companies Business Stream (BS) is a separate company operating under license responsible for providing retail services to business customers, including billing business customers. The figures in tables B4 and B7 now relate to Scottish Water's responsibilities only.

Scottish Water retains a small Sundry billing section to bill for such items as trade waste, metered domestic supplies and so on. The remainder of the information on written complaints are generated from the "Promise" customer contact system, which is used for all Scottish Water operational contacts.

Part way through this year BS has moved from its previous office at Fairmilhead to a new office. Since this time the telephone system has not been shared giving added comfort that all management systems are completely independent of Scottish Water (previously the telephone system had been partitioned, which also gave reasonable comfort).

Key points:

Since last year Scottish Water has undergone a reorganisation but this has not had a major impact on customer contacts and billings that provide the information for tables B4 and B7 and we believe that methods used this year are similar to those used last year.

Customer Services is now called Customer Services Delivery and encompasses not only customer contacts and billings but the whole of operations. Scottish Water takes the view that all of its operational staff should be focussed on its customers.

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.

As for the previous two years Scottish Water 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, the Complaints Management Unit (formally Customer Relations). Scottish Water's philosophy is that all complaints are dealt with at the time. The specialised Complaints Management Unit gives confidence that complaints are dealt with efficiently. The Complaints Management Unit will nearly always respond in writing, but in some cases a telephone call or visit from a Complaints Management Unit Representative is considered to be more appropriate.

Scottish Water does have procedures in place to re-direct complaints received directly by its 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 the Complaints Management Unit. Complaints received by the licensed providers, including Business Stream are received at the Wholesale Service Desk. Last year there was some miscoding, leading to a manual adjustment. This has not been repeated in the report year. While any system can miss a few complaints we believe that Scottish Water's systems and procedures should deal with complaints properly.

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.

As required, all telephone complaints have been included in Line B4.29.

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 Complaints Management Unit person dealing with the matter. Any initial written response to the customer gives a personal contact number should the customer want further information. Also occasionally the original contact can have more than one item of correspondence. 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). However, a significant number of incoming calls are transferred. Transfer calls relate to calls to other departments within Scottish Water. The telephone system is unable to identify easily the destination of these calls but previous discussions with customer representatives 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 Service, covering:

- Customer contacts
- The Complaints Management Unit (complaints)
- Customer billings
- Telephone contacts
- GSS payments

For a sample of datasets we:

- asked Scottish Water to run the query that produced the entry; and
- reviewed a small sample of records at random.

We did not audit the quality of items such as written responses.

Comments on Methodology

General

Following the major changes over the last two years resulting from the wholesale – retail split, this year has again been a period of consolidation in Customer Contacts and Customer Billings.

In previous years we have described Scottish Water's systems and methodology in this section. For completeness we repeat this with some 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 Scottish Water'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 Contact's work.

Customer Contact's is organised into 3 main sections, with sub-sections and more minor sections as follows:

1. Customer Management Centre (formally Customer Resolution): the call centre.

2. The Complaints Management Unit

3. Household Billing and Sundry Billing; Household Billing liaises with local authorities over domestic non-measured customers and Sundry Billing bills for other customers billed directly by Scottish Water.

In addition to these departments Customer Services Delivery includes:

1. Business support
2. Trade effluent
3. Marketing
4. Work planning
5. Telemetry
6. Water operations
7. Wastewater operations

The Customer Management Centre is manned 24 hours per day for 7 days a week. Sundry Billing is 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.

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 WICS 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 years before 2006/7 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; they were deemed to be "1st time resolution"). 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 Promise.

In 2005/6 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 current reduction in data requirements following the wholesale-retail separation and the fact that most calls are now logged onto Promise this fact is less obvious. Without further programming of the telephone system it is not possible to get a breakdown of the destination of these unlogged 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 WICS. However, in prior years we have 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

Scottish Water retains a small sundry billing department which bills for:

- Septic tanks
- Trade effluent
- Standpipes
- Laboratory

- Metered domestic customers
- Rechargeable Works

In the reporting year the department has moved from Glasgow to Inverness. In both locations it is completely independent of the main Customer Contacts section based at Fairmilehead.

The department has opted to use the billing module of its "Peoplesoft" financial accounting system for its work.

Unlike Hi Affinity (the previous, larger, billing system) Peoplesoft cannot "link" contacts, keeping separate dates for each contact. When a letter is sent in response to a contact the contact is closed. Scottish Water reports that holding responses are not sent, billings queries can be responded to in full in the allotted time. Some contacts are with Scottish Water personnel about a customer rather than the customer himself. Where these are initiated by the operator they are logged as "outbound" and are not included in the statistics. However a small proportion is inbound calls and these are included in the statistics.

Some lines in Table B4 are generated from records of invoices and are not generated from Peoplesoft (see commentary by line).

We reviewed the codings available to the operators and recommend that, after 2 years of usage, Scottish Water reviews the codes to see if Peoplesoft can generate all the lines in Table B4.

Voids are not recorded on Peoplesoft. The only voids that affect Peoplesoft are on domestic metered supplies, of which there are very few. As bills are raised on the basis of meter readings this is not an important consideration.

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.

Last year we noted that first time resolution contacts were not logged onto Peoplesoft, which therefore did not keep a record of all contacts in the department. Scottish Water reacted to our comment by logging all calls that it considered practicable. We understand that it remains the case that not all calls are logged but we believe that the calls logged are significantly more than last year.

Many calls relate to credit card payments and these are not included in the return

Receipt of mail

Mail is received in the applicable post room and it is immediately sent to the relevant section which records it on Promise or Peoplesoft. We accept that mail is logged on to the system on the day that it arrives subject to our comments elsewhere on mail arriving after 2.00pm which is assumed to arrive the following day.

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 Complaints Management Unit. This is a small department of experienced staff whose sole job is to resolve complaints. The Complaints Management Unit will nearly always respond in writing, but in some cases a telephone call or visit from a Complaints Management Unit Representative is considered to be more appropriate.

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

Written complaints come direct to the Complaints Management Unit. 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 The Complaints Management Unit. If an Adviser receives a letter and they believe that the letter constitutes a complaint then they scan it and send to The Complaints Management Unit.

We noted that written complaints that arrived after 2.00pm was recorded as arriving the next day. The Complaints Management Unit aims to respond within 5 working days.

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 a complaint or other communication does get through to the contractor the contractor is instructed to divert the call to Scottish Water. Mail is also re-directed. The contractor is required to note the day that the letter was received and it is this date that is logged onto the system. In discussion with the Contractor's Liaison Adviser in the customer Management Centre it was stated that the complaints that go to contractors are minimal. This is accepted.

The Complaints Management Unit uses Promise to manage its contacts in the same way as all other advisers. Where response letters are sent The Complaints Management Unit record this in the memo field and keeps the contact open on the system.

Many complaints take time to respond to as investigations have to be made which can include engineering works such as digging up a main. Therefore most responses that generate the statistics are letters that inform the customer of future action and not the action itself (these are called responses; Promise allows both response dates and resolution dates to be completed against a contact). However, Scottish Water informs us that the letter always describes the work that Scottish Water is doing to resolve the problem.

We note that the Reporting Requirements state that an allowable response is one that *"informs the customer of when action to resolve his/her complaint will be taken if action cannot be taken immediately: for example 'programmed capital works are not scheduled until(month and year) and should be completed by (month and year)"* whereas a reply which advises the customer "*of the need to undertake additional research or other actions before being able to respond to the customer's complaint"* is defined as a holding reply and does not fulfil the definition of a response. While in some cases we believe that

Scottish Water's responses do refer to further investigations these will normally refer to engineering investigations that depend on external influences as to their timing (e.g. roadworks) that are outside the control of Scottish Water. We therefore believe that Scottish Water's statistics do meet the reporting requirements, although the definitions of a holding letter are slightly ambiguous.

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 Complaints Management Unit. 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 The Complaints Management Unit 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 complaints 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 normally impose no restrictions on the system (for the first time this winter for short periods the number of lines proved to be insufficient, see line commentary).

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 both Promise (Customer Contact System) Peoplesoft (Sundry Billings). In 2005/6 we noted that a significant number of incoming calls were transferred. Transfer calls relate to calls to other departments within Scottish Water. The telephone system is unable to identify easily the destination of these calls but discussions with customer representatives at the time indicated that many were transferred to Developer Services (new connections), whose calls go through the call centre.

Scottish Water uses BT's Message Link system during incidents, of which there are several every month. During our audit we noted that these amount to a very significant percentage of all calls (204659 out of 540520 this year; up from last year and reflecting the high number of incidents over the winter period). These are correctly included in the return and are based on information provided by BT.

Scottish Water has previously assumed 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). Two years ago 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. Last year Scottish Water considered our comments and reviewed the situation with us. We listened to the message and concluded that the salient part of the message was reached in 3 seconds and agreed with Scottish Water that calls terminated within 3 seconds should be defined as calls abandoned. These only amounted to 1505. Unlike last year they were subtracted from the reported total and moved to calls abandoned.

The Sundry Billing Department, which is located at Inverness and not with the other customer services departments in Fairmilehead, has its own telephone number and uses the system at Scottish Water's Inverness office. Scottish Water reports that the system in Inverness is unable to provide the information required in Table B4 (as was the previous system in Glasgow) and so again they have not been included in the statistics.

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. For the audit we met the team leader and examined the Gemini records on-line to see how data is transferred to the monthly reports.

Scottish Water operates three 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.

Scottish Water operates two charging schemes: domestic and commercial (at an approximately 20% premium). Domestic septic tanks serving five or more properties are also charged at the higher rate.

In August 2009, Scottish Water commissioned an internal review of the septic tank emptying service from initial request to tanker emptying sign-off and customer billing. This is ongoing.

The team regularly accesses Promise to see if any new requests have been received. These requests will be either contract based and involve detail arrangements with existing customers, or unscheduled requests where the team contacts the customer. The team identifies the level of service the enquirer needs and gives the prices for the three levels of service, pointing out the cheaper levels and the better than advertised response times for emptying. We were informed that many enquirers change their request at this stage, either opting for a lower cost level or rejecting Scottish Water's offer, presumably in favour of some private emptying service. Scottish Water's team tries to ensure that septic tank owners are aware of their responsibilities under pollution control law. Each new contact is recorded in Promise, but the team often recognises multiple enquiries from the same address.

Domestic and commercial enquiries are identified at first contact stage and opportunities for correction occurs later when customer names, details and observations are received form the tanker drivers. Any new enquiry for a commercial property is directed to Scottish Water's Waste Services retail arm.

All requests are entered on the Gemini database, a commercial tool used for controlling tanker movements as well as on the IMS system, where tanker drivers receive instructions through hand-held devices. This system was introduced in AR09 and is almost universal (excepting Orkney and certain contracted emptyings). Tanker drivers report uploading, unloading at a WwTW and job completions in the same way. The current system is much improved on the faxed or posted paper instruction system used before. As part of the internal review, lists of long-outstanding contract emptying have been compiled and are subject to checking with septic tank owners.

During the audit we viewed a very small sample of Gemini entries and noted the following:

- Customer invoicing is automatic through Peoplesoft after job closure by the tanker driver.
- WwTW loads can be traced back through the tanker data, but septic tank contents destinations are not individually recorded.
- Scottish Water only charges one property of a group served by a common septic tank; that owner has to recharge the others connected.
- Emptying requests must be entered both to Gemini and to IMS separately, and we noted that one case had been missed in IMS. This case had been identified in backlog lists and should have been captured in Scottish Water's cleansing exercise.
- We found one property where there were two septic tanks which were separately and correctly recorded, one domestic, one commercial.

We consider the records to be generally well kept and complete. The use of IMS is a valuable improvement on the previous, paper based system.

The total tank emptyings in AR10 are 289 lower than AR09 (from 14946 to 14656), and this is attributed to operational changes. There was a bigger drop between AR09 and AR08 of 1583.

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

For the return at the year end Scotland is divided into four areas for practical data handling. For the audit the data was re-extracted using the same method and showed 190 more completions as the more remote operator's data (Orkney) caught up.

From the total emptying data, contract emptying was excluded through a "NULL" condition in the next date due field. Emergency emptyings are identified by their higher charge rates and excluded, leaving the ad hoc emptying data. A calculation for numbers of working days is applied and bandings applied for the return figures on ad hoc emptying by working days.

Given that the data is entered using a hand held device that imposes a discipline and is analysed through a corporate system we believe that the reported figures are likely to be accurate within the quoted confidence grade.

Comments by Line

Lines 1-7: 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 and credit card payment calls are excluded.

The inputs that generate Line 1 are as follows:

Total number of enquiries	7819
Less outbound calls	724
Less credit card payments	3221
Enquiries to Line 1	3874

The figures are marginally higher than last year. Enquiries are tracked daily and Scottish Water answered all queries within 5 days.

Lines 8-14: Last year Scottish Water made a zero return for these lines. Two years ago Peoplesoft did not have the ability to offer customers alternative methods of payment. Last year Scottish Water was able to accept direct debits and was proactive early in the year in contacting those customers for which a direct debit was appropriate to ask them whether they wanted to set up such an arrangement. Many of Scottish Water's billings are now reactive in nature and so different payment methods are not appropriate.

Because last year Scottish Water was proactive the calls were logged as outgoing and were not considered an enquiry. This year there were 33 enquiries. Given that most billings are reactive to work done (other then the few domestic metered billing) the change of payment method enquiries relate to people who have got into arrears and are asking Scottish Water to agree a payment plan to pay off their outstanding bill. Thus Scottish Water's statistics will be very different to other water companies.

Lines 15-21: Written complaints have reduced since last year despite the bad winter which significantly increased the number of customer contacts. Last year appears to have been an aberration as the levels of complaints, while remaining higher than two years ago, have fallen back (4522 complaints received compared to 5086 last year and 4007 in 2007/8).

Numbers include complaints received by the licence providers. These come via Scottish Water's Wholesale Service Desk.

Scottish Water report that all but one response was within the 10 day benchmark. As reported above Scottish Water generates the statistics from the response date and not necessarily the final resolution date of the problem. We believe that Scottish Water's responses are substantive but have not specifically audited responses for quality as we understand that this is done by others.

The response in Line B4.15a is generated from linked contacts as described above. Additional correspondence that arrives while the initial contact is still open will not be recorded.

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 accurate.

Calls to the Sundry Billing Department, located at Balmore Road, and from December 2009 onwards Inverness, are excluded.

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 increased by 5%. An analysis of the calls shows that in January calls received increased from a normal monthly average of around 42,000 calls per month to 93,400 calls as a direct result of the severe weather. For the first time peak call numbers exceeded the capacity of Scottish Waters 105 lines. Scottish Water drafted in staff from elsewhere in the business to assist the call centre. Facilities within the call centre proved adequate. As a result of the very high number of calls Scottish Waters service level reduced from an average of 96.93 for the other months in the year to 92.45% in January. This month alone can explain the overall reduction in service level for the year. We believe that Scottish Water is to be congratulated on its response to the unprecedented number of calls that it received in January.

Total telephone complaints are recorded directly on Promise by the Adviser who has the relevant code to hand.

Lines 30-40: Total ad hoc emptyings (Line B4.34) have increased as Scottish Water has tried to persuade customers onto lower cost service levels from emergency rates. Changes between the lines B4.30 to 40 for numbers of working days may be as a result of improvements for operational efficiency. However, the increase in emptyings requiring more than 30 days is believed to be caused by icy conditions on roads and at customers' properties in the exceptionally cold weather of winter 2010.

We note that Scottish Water's management of septic tank emptyings has improved this year, and we look forward to further improvement after the completion of the current review.

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.

Scottish Water has assigned a confidence grade of B2 to its return on change of payment method enquiries. These relate to enquiries into agreeing a slower method of payment to stop a customer getting into arrears. We accept this confidence grade although the return is likely to be at the better end of the grade.

For new written complaints Scottish Water has altered its confidence grade to A2 from last year's B2. Scottish Water reports this reflects the fact that no manual intervention was required this year. We believe that the confidence grade of A2 is reasonable. There will always be some uncertainty in the figures due to the subjective nature of defining a complaint.

We accept the confidence grade of A1 for the information on telephone contacts as the information comes directly out of the telephone system.

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

5.7 Table B7: Customer Care – GMS Performance

Commentary by REPORTER

Introduction

Key points:

- As for last two years Scottish Water manages its GSS payments through 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.
- Methods in relation to recording GSS payments are little changed from last year. This year we again audited entries back to base records and found them to be consistent.
- GSS payments are generated by a mixture of the responsible department generating payments and the GSS Department monitoring corporate systems. It is possible that some GSS payments can be missed due to human error but we think that it is unlikely.

Comments on Methodology

For the reporting year, GSS payments continue to be managed by a small dedicated team. The methods employed by the team were described last year and for completeness this description is repeated below.

The team generally obtains its information from access to Peoplesoft, Infoview and Promise and other corporate systems. GSS payments relating to written complaints come from information provided by The Complaints Management Unit. Most ex-gratia payments are public liability claims and are managed by Scottish Water's Claim Team, who informs the GSS team of its payments.

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 manages the process, including dispatch of cheques. On the issuing of a GSS or Ex-Gratia payment the GSS Team or Claims Team includes a copy letter to allow the customer to confirm receipt of the payment. It is the customer's choice whether 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. Scottish Water's bank account is also monitored to check if the cheque has been cashed. We note that Scottish Water does not 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 cancelling the cheque and issuing a replacement cheque.

Records relate to payments made in the year. Items that may have occurred in past years are included. Where there have been protracted negotiations these can go back two years or more. Ex-Gratia payments generally relate to public liability claims which can take some time to resolve.

Hard copy records, including completed cheque received forms, are kept. This year we audited a sample of records of different types back to hard copies and found them to be consistent. We were impressed by the standard of records kept by the department.

We believe that the new system is a significant improvement on the system before the GSS and Claims team was set up in April 2007. 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 Scottish Water 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 entries.

Comments by Line

Planned interruptions have decreased by 29% following last year's trend. The number of claims for planned interruptions as a percentage of planned interruptions is 50% of last year's figure. Scottish Water notes that better processes have enabled the validity of claims to be more accurately assessed.

Unplanned interruptions have increased by 22% since last year (which had increased by 14% over the previous year). The number of GSS failures claimed for unplanned interruptions as a percentage of the number of interruptions has doubled. Scottish Water ascribes this to the severe effect on the network in January.

Sewer flooding incidents have reduced by 7.5%, which is not surprising following the serious flooding in August 2008. However, Scottish Water also reports that Flood Investigations teams are believed to have had an impact. The number of payments, as a proportion of incidents, has declined by 11%.

Payments for failures to deal with billings contacts and customer complaints are very small, reflecting the reduced number of contacts. All responses are targeted on a 5 day response. As mentioned in Table B4, statistics relate to a substantive response and not necessarily to the final resolution.

The number of appointments made has increased by 77% this year following a 13% increase last year. Scottish Water has increased its appointments as a way of improving its customer service. Failures are down for last year and are very low. If the representative cannot make the appointment, contacts the customer and re-schedules the appointment within 24 hours notice it is not counted as a failure.

While still very low, failures concerning meter applications have risen significantly in percentage terms. Scottish Water reports that this results from a process failure and the figure should decrease again next year.

Low pressure incidents have also increased in percentage terms. Scottish Water reports that it now has a low pressure register and is better able to track when payments are required.

The most significant payments are ex gratia payments and numbers are similar to last years (ex gratia payments are not GSS payment but are included within the B7 GMS table). Scottish Water attributes the majority of payments to vehicle incidents.

Comments by Confidence Grade

Scottish Water has generally assigned an A1 grade to the GSS payments lines. Given the quality of Scottish Water's records we accept this confidence grade.

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 H3.4. There was a 7% increase in the year AR10.

For AR10, WICS only requires the Reporter to comment on lines B8.1 Water Mains Bursts per 1000Km, B8.11 Sewer collapses per 1000Km and B8.16 Sewer blockages per 1000Km.

Scope of the audit

In this audit we reviewed the Technical Approach, a spreadsheet of the works order data analysed by Scottish Water for the lines and summaries of these. We reviewed the data quality in WAMS and as part of the review interviewed site staff about entering data on their hand held devices

Comments on Methodology

Mains bursts per 1000 km Line B8.1

.The methodology used for reporting mains bursts is the same as for AR09. The data for the report year comes from WAMS, the burst repair work orders entered into WAMS coming from two sources: customer reports and active leakage control returns. Most arise from customer reports of leakage but the proportion from active leakage control fell to 19% in AR10 (from 23% in AR09). There was a fall in the number of bursts repaired as a result of active maintenance (47 to 42 per 1000Km of main) but also a rise in the number of reported bursts (157 to 176 per 1000Km). Scottish Water's monthly analysis shows the latter rise to be associated with the severe winter conditions in January to March 2010. In both cases some work is carried out by Scottish Water's staff and some by external contractors managed by Scottish Water.

WAMS jobs are raised for all burst repairs carried out by Scottish Water. This is done from data entered on 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 150 to 300mm
repair burst 300 to 600mm
repair burst >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 handheld 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.

In AR08 we saw 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" carried a comment but confirmation was often only implied e.g. "Repair 3in main" or "repair leak on 4" main". We believe that the omission of a site identified direct confirmation of a burst from the data does reduce confidence in that data.

Because of our observations about closing service requests and works orders in AR08 we asked in AR09 to see how site staff were able to carry out accurate closure on their hand held devices. This is reported below. The system remains unchanged and therefore the general accuracy of information available for AR10 is the same as in AR08 and AR09.

Burst or fault location is related to property address code for the customer contact 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, is frequently omitted and is sometimes entered in a format not readable by computer.

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 Scottish Water's Governance, Information and Value (GIV) group 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 a spreadsheet process.

The length of main used in this line is the same as in Table D5.8, E6.16 and H3.4.

We conclude that the data extraction has been well done but, in common with some other data sets that are taken from WAMS, suffers from inconsistent data entry at job closure.

Site entry of data (affects all lines with data extracted from WAMS).

In AR09 we were able to see how Scottish Water's site staff use their hand held devices (IMS or robust computers) to react with the service request and works order systems, Promise and WAMS. We especially noted how jobs are closed and the data available to the GIV function.

These comments are relevant to water mains bursts, sewer collapses and blockages and equipment failures. We also comment on non-captured data when discussing the water mains and sewerage network records.

Service enquiries are raised in Promise and sent via hand held devices to one of Scottish Water's network operators or inspectors who will attend the site. If possible the operator will clear the problem; if not a works order will be requested for a sewerage or a water distribution squad to attend. The operator can change the problem location by Ordnance Grid Reference at this or a later stage to more closely relate to the affected asset. He or she will normally provide more information for the squad such as diameter and depth to allow more efficient site work.

Some small sewers and almost all lateral sewers are unrecorded by Scottish Water. When such an asset is discovered through Scottish Water's attendance on a problem, the sewer will usually be investigated so that the operator is fully knowledgeable about line, level, material etc. However, the information is then lost (the reason given for not recording the data was pressure of time in the face of needing to move to the next distressed customer). We noted that it was relatively easy for operators to draw a reasonably accurate line on the asset plan shown on their device screens.

The operators interviewed stated that they did complete resolution codes and freeform text fields when closing their works orders down. Such records as we have examined in the course of the audits show that such completion is inconsistent across Scottish Water.

We are aware that the Business Plan contained provisions for improvement in Scottish Water's IT software, including WAMS. We understand that Scottish Water has no current proposal to improve WAMS.

Water Treatment Works Turbidity Lines 8.2 to 9

Not required to be audited in AR10

Comments by Line

Line B8.1: The reported number of bursts per 1000km of main shows an increase compared to last year. We note the high numbers of bursts associated with the severe winter weather of January to March 2010.

Lines B8.2 – 8.9 Not audited in AR10

Comments by Confidence Grade

Line B8.1: The number of bursts comes from the WAMS/Ellipse database. The quality of data is unchanged from last year and the confidence grade of B3 seems reasonable.

Lines B8.2 – 8.9 Not audited in AR10

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

Introduction

Key points:

The WICS requires reporting in AR10 against lines B8.11 Sewer collapses per 1000Km and B8.16 Sewer blockages per 1000Km and reporting on lines B8.10 and B8.15 (the total numbers) is incidental.

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.

Scope of the audit

We inspected WAMS data analysed in this line as well as a undertaking a detailed audit on a very small sample to ensure that Scottish Water's Technical Approach was followed. We were concerned with the use of some of the WAMS data resolution codes at the end of a job and subsequently spoke with site staff about resolution codes and job closures.

Comments on Methodology

Sewer Collapses Line B8.10

The methodology that Scottish Water use to compile data for this line is generally the same as in AR09

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.

Works Orders (WO) with creation dates within the audit year are extracted from the Corporate Data Repository. WOs with closed status "Cancelled" or "CP" (partially completed) are excluded. Changing to extracting data for completed work would complete the analysis by including the small numbers of WOs that are raised within the year but completed in the following year and lost from reporting.

There are 15 standard job codes in WAMS that are relevant to sewer collapse and these have been used to extract data for the collapse figures. Additional data fields are used in 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 best placed to identify whether the work is on a public sewer or not and whether the sewer has collapsed. However, this information is not necessarily captured. In our review we have seen the full data from which the number of collapses is derived by GIV. We comment on site generated data elsewhere (see commentary on Line B8.1). We are concerned that other information may show that a sewer collapse was not the problem but completion information and resolution codes are not always helpful (For instance, on WO02022292 we read "Repair to laterial (sic) sewer" in the standard job code but "Choked Pump No 1" in the work order description).

WOs 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. We believe that Scottish Water's investigations into possible duplicate jobs are sensible but may not be undertaken by others.

The codes in WAMS do not specifically identify failures on rising mains but Scottish Water uses WAMS codes related to its own assets to identify these. The reporting process in AR10 is the same as in AR09. We do not believe current methods are satisfactory and cannot substitute for properly recorded on site information. We again recommend that Scottish Water reviews its coding system to improve data quality.

We recommend that recording of both collapses and blockages is improved. Works orders should not be closed until the resolution of the job is clear and accurately recorded and the position of the problem has been amended in line with the Scottish Water asset

Sewer collapses are normally identified by a customer report to Promise from which a service request is made to an operator or inspector to attend. The operator will confirm the reported problem and call out the appropriate squad using a works order raised through WAMS. The data from these sources is placed in Scottish Water's Data Warehouse from where it may be extracted by the relevant query.

Sewer collapse data is extracted from WAMS using sewer repair standard job codes of which there are 14. The data is downloaded to a spreadsheet and sorted by postcode and date of completion. Work orders that relate to a single postcode and that are within 21 days are regarded as a single sewer collapse. We inspected the data extraction spreadsheet and were able to verify that the vast majority of works orders without a post code or with a dummy postcode were in fact Scottish Water's own assets – pumping stations and WwTWs. These were excluded from the count for gravity sewer collapses.

However, when rising mains are considered, the postcodes are ignored and the works orders are allocated to the Scottish Water asset, usually a sewage pumping station.

We conclude that the data extraction has been well done from corporate systems. However, we believe that the quality of the data in those systems could be improved. As for last year, resolution codes and inserted comments in WAMS do not have to be completed before the job is closed and data may be lost or be uncorrected from first identification.

Blockages Line B8.15

The methodology used to report the line is the same as in AR09. The base data used to identify the number of blockages in the year was taken from Scottish Water's PROMISE customer contact system. Most blockages are reported by the public but problems have to be recorded in Promise to raise a service request. Service requests are passed to choke squads for investigation and action on site via hand held devices.

When the choke squads have finished their site work they use handheld devices (IMS) to record the task completion according to mandatory resolution codes. 15 codes used for odour, backing up and flooding relate to problems which may be caused by a blockage and their use automatically raises a non-mandatory choke form to the squad. If a choke form is used then it must be completed before the job can be closed and only choke forms completed with "Blockage/Defect" as the cause contribute to the blockage records.

We inspected a very small sample of five service requests and their relevant choke forms which confirmed the procedure.

We conclude that the data extraction work has again been well done this year.

Scottish Water has recorded 19571 blockages in AR10, 11% more than in AR09. There is a common upward trend through all the regions during the winter months.

Total Sewer length for lines B8.11 and 16.

Scottish Water has stated that the total length of sewer is based on the total length of sewer in GIS with two additions for unrecorded sewers that are assumed to exist but are not yet in the asset inventory.

The 1000 Km of off-inventory main sewer included in 2006 when the first GIS assessment was undertaken has been reduced to 650Km for discoveries over four years.

Lateral sewers are not recorded in the sewer records and the length is recalculated each year on the same basis of rural and urban samples of dwelling types. Lateral sewers are calculated to be 16344Km in AR10, a reduction of 59Km. The methodology is consistent with that for AR09 and is discussed in the report for Tables D7 and H4 and the figure is consistent with those Tables.

Intermittent Discharges: Lines 12 to 14

Not audited in AR10.

Equipment failures: Line 19

Not audited in AR10.

Sewage treatment works performance: Lines 8.20 to 37

Not audited in AR10.

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 not the same as that reported in Line E7.14 as it excludes third party collapses.

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

Lines 12, 13: Not audited in AR10.

Line 14: This is a calculated field.

Line 15: Data includes blockages that caused flooding and therefore the number is not directly comparable to AR08.

Line 16: Based on the number of jobs recorded on the work planning system, WAMS.

Line 17: Not audited in AR10.

Line 18: B8.10 minus B8.17.

Line 19-37: Not audited in AR10.

Comments by Confidence Grade

Lines 10 to 19: We agree with the confidence grade of B3.

Line 8.15 and 16: This number is derived from Scottish Water's corporate data system. Although the choke form is not yet mandatory, data quality has improved and we feel that grade B2 may be justifiable this year.

5.9 Table B9: Security of Supply Index

Commentary by REPORTER

Introduction

Key points:

- The SoSI was calculated for 'Planned level of service' (Table B9a) and for 'Critical period level of service' (Table B9c).

- Since AR09 and the Business Plan Scottish Water has adopted a target Level of Service for a drought order of once every 40 years in any water resource zone.

- Table B9b: *Security of Supply Index – Reference level of service* has not been completed, which we understand from previous returns is with the agreement of WIC. Scottish Water argues that the 'Reference level' definition (Ofwat 1997 Reassessment of Water Company Yield) is not the same or applicable to Scotland because of the characteristics and diversity of Scottish Water's Resource Zones, a single return period for Hose Pipe Bans is not appropriate for all 220 WR zones and because "a hosepipe ban will be imposed once the process of applying for a Drought Order has been initiated". Scottish Water has not imposed a hosepipe ban in 2009/10.

- We believe that the information presented by Scottish Water in the B9 tables gives a reasonable representation of the resource situation in Scotland under current legislation.

- The Scottish Water 2009 Water Resource Plan (WRP) includes an assessment of the impact of the implementation of the Birds and Habitats Directive and the Water Framework Directive, but does not take account of climate change in the analysis. Scottish Water states that it does assess the robustness of a new water resource against climate change. Likely future reductions in abstractions under the Water Framework Directive have been taken into account in the analysis. There is no requirement for SEPA to approve the plan, although SEPA has issued a letter stating its overall agreement with the plan.

- The 2009 WRP has not been revised. However hydrology investigations, calculation revisions and data cleansing have resulted in yield changes for 49 sources. Some changes are minor. However closure of Ashgrove WTW due to the quality of the raw water reduced the SoSI score by approximately 4.5 points.

- We remain of the view that it is a weakness that site specific factors have not been derived for all the larger zones and works for which an outage allowance applies; the 3% currently assumed may be material where zones are marginal.

- Scottish Water continues to assess raw water transmission mains using an assumed overall average leakage of 21 m^3/km/day. The estimate for the Water Balance suggests trunk main leakage is at 10.05 m^3/km per day and a calculation for the raw water main to Gorthleck WTW suggests losses of about 50 m^3/km/day. Although there are arguments why raw water losses may be greater than potable trunk main losses, we recommend that Scottish Water investigates and quantifies losses in a sample of mains where zone resources are in deficit.

- In previous reports we have discussed how uncertainty in the estimation of some of the inputs to the analysis can lead to uncertainty in the deficits in some areas and hence the SoSI score. This can be material where deficits are small. During the audit, sensitivity analyses tested generic assumptions of *'Outage Allowance'* and *'Treatment Works Losses'*. The analyses suggested that they made marginal difference to the SoSI in 2009/10, but as leakage is reduced, the impact of these minor components will become more significant to future SoSI scores.

- As stated in previous reports, Scottish Water interprets the definition of "water resource system" to include the capacity of the WTW when calculating deployable output. 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.

- There is consistency between Table B9 and the numbers used in the water balance and Table A2.

- The Critical Period SoSI in 2009/10 is +19, implying that 26% of Scotland's population (1,320,063) are in deficit in 111 zones.

- As for last year this return has been calculated using current measured data in the SoSI calculation.

Audit Process

The audit was carried out by interviewing members of Scottish Water's Water Resources Team staff responsible for the compilation of the B9 tables. We were given access to data held on Scottish Water information systems.

During the audit we reviewed:

- The methodology for calculating the Security of Supply Index.
- The copies of spreadsheets and data sources used in the SoSI calculation.
- Reports supporting factors and assumptions used in the SoSI calculation.
- Calculations for 4 zones; rezoned Ashgrove into Afton (002/004), Blackpark (055), Black Esk & Kettleton (237)) and Ardrishaig (257).
- Sensitivity analyses for some factors including TW and trunk main losses, outages, peak factors
- The consistency of data with that reported in the A tables.

We understood the basis of the current situation with water resource planning in Scotland and confirmed that the methodology was the same as used for the previous return and the business plan submission. Ongoing data improvements have been carried through into the calculations and current year measured data have been used. We checked sample lines in the SoSI tables to confirm the audit trail back to the base spreadsheet calculation.

Water resource planning in Scottish Water

For the current reporting period, the number of Water Resource Zones has reduced to 220 from 230 in AR09. The reduction results from the amalgamation of a number of smaller zones.

Since 1998 Scottish Water has developed a water resource planning methodology. 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 and progressive data improvements up to the business plan. SEPA also provided guidance for the development of water resource plans, including guidelines to take account of the Water Framework Directive, the Birds and Habitats Directive and the SEPA CAR licensing system. The process is similar to that used for producing plans by English and Welsh water companies. Completed plans are submitted to SEPA for review.

A 'draft' Water Resource Plan (WRP) was prepared in 2008 and updated in March 2009. There is no requirement for SEPA to approve the plan, although SEPA has issued a letter stating its overall agreement with the plan. The plan does not take account of climate change. However Scottish Water has stated that it assesses the robustness of a new water resource against climate change. Likely future reductions in abstractions under the Water Framework Directive have been taken into account in the analysis.

The effect of climate change is not included in supply-demand tables because SEPA required 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 primarily during August and September, but no change or wetter conditions for the remainder of the year. Thus only the DO of river intakes or 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 to be as significant in Scotland compared with other parts of the UK.

The 2009 WRP has not been revised. However there have been yield changes to 49 sources. The changes are summarized as:

Yield change explanation	No of WRZs
CAR over abstraction /variation	10
WR1 / WG4 programme updates	12
Yield improvements	5
Sources added or removed	3
Minor numerical /data cleansing changes	19

Methodology for calculating SoSI

Scottish Water's levels of service

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

- A target level of service for a drought order of once every 40 years in any water resource zone. This is similar to the reference level of service in England and Wales, although companies can have different levels of service. SEPA broadly supports the level of service. In the absence of zone specific historical data, we believe that a common level of service is equitable.

- Scottish Water has not defined a target level of service return period for hosepipe bans, and does not intend to implement rota cuts or install standpipes since there is no historical evidence of the need for their use.

No drought order or hosepipe ban has been imposed in 2009/10. Therefore there is no target return period for either measure.

Numbers of water resource zones

Scottish Water currently has 220 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.

The number of zones has reduced from 230 through resource rationalisation and amalgamation.

Deployable output and water available for use (WAFU)

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

Deployable output is constrained either by the SEPA CAR licences 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.

Scottish Water has developed 67 HYSIM-Aquator 'behavioural analysis' yield assessment models to evaluate WAFU at most major demand centres (water treatment works) served by large surface water reservoirs. The models cover 251 sources in more than 43 Resource Zones which are said to account for approximately 80% of the Company's total output. For the other 20% of mainly small resource zones where insufficient data are available to provide model inputs or where system complexity does not merit modelling, source yields have been estimated using the CEH Report 108 "Low Flow Estimation in the United Kingdom" as modified for Scottish catchments. There are inconsistencies between HYSIM and Low Flows 2000 and further studies will be required in due course to investigate these inconsistencies.

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

The SoSI calculation represents the current situation. Future potential reductions in abstraction licences resulting from the Water Framework Directive or changes as abstraction monitoring becomes more comprehensive and over abstraction is addressed have not been included this year's calculation.

Under a Ministerial Directive a total of 521 sites (Regulatory Outputs) have been signed off by SEPA to provide additional monitoring to supplement the gauges already operated by SEPA as part of the WR5 measurement and monitoring programme. This equates to 307 abstraction monitoring points. Scottish Water reports that for reasons of technical feasibility and disproportionate costs, Scottish Water agreed with SEPA the location of individual metering equipment. Not all of the installations are at the point of abstraction and many have been installed at the inlet to the WTW; in these cases it will not be possible to assess raw water losses.

Scottish Water has also reported to SEPA, reliability and technical difficulties being experienced with some of the data collection systems from the data loggers on site, through telemetry and into the reporting systems and is working on the issues to improve this situation

Scottish Water has interpreted the definition of "water resource system" to include the capacity of the WTW when assessing deployable output. Thus, in some resource zones available headroom is limited by WTW capacity. As commented in previous years, 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

An outage allowance has been applied to 42 Water Resource Zones where the WRZ is considered to have an annual average critical period.

For the 2008 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 previously assumed values of between 5% and 10%. Of the 38 zones, 9 zones had deployable output greater than 10 Ml/d and 2 zones over 100Ml/d. Here the outage allowances ranged from 0.06% to 1.06% with the values for the two large zones being 0.05% and 0.06%. 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%.

Further work to assess Outage allowances for works with DO greater than 1 Ml/d. where the Critical Period D.I. is the average D.I. and therefore covers all WRZ's where Outage is included in the Critical Period Analysis resulted in revised zone specific allowances range from 0.06% to 1.06% with the values for the two large zones being 0.05% and 0.06%.

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

For this annual return, Scottish Water has again used:

- The zone specific outage values for zones/works previously studied.
- For other zones not included in specific studies:
    - 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.

During the audit we questioned the sensitivity of these assumed percentage allowances. Scottish Water undertook an analysis using 1% and 2% for WRZs greater than 1Ml/d DO. The conclusions from the analysis are:

- 98.6 % of the population are within zones with a deployable output of over 1Ml/d,
- 1.4% are in areas with deployable output of less than 1Ml/d.
- The reported DYAA SoSI score for AR10 was 25 (25.805).
- Changing the outage allowance from 3% to 2% increases the SoSI points to 26.395.
    - 7 zones account for 0.59 SoSI point increase.
- Changing the outage to 1% the SoSI score increases to 26.867.
    - The same 7 zones increase the points by 1.062.
- No water resource zones come out of deficit into surplus when changing the outage allowance.

During the previous AR audit Scottish Water stated that it intended implementing a full scale outage date collection trial in the Tayside/Fife zones. This 6 month study took place between December 2009 and May 2010

We commend Scottish Water for both extending the works outage analyses to include larger zones and works and for completing the sensitivity analysis. Although the sensitivity analysis did not suggest that there would be major changes in the SoSI points, it does suggest that more precise outage data for deficit zones will contribute to improving decimal points in the score.

We still recommend that the programme of site specific studies be extended to all the larger sites, and that a company wide outage information acquisition procedure and database be established to support future analyses. Recognising the marginal difference that the improvements will make we suggest that the studies be implemented opportunistically as and when other studies are initiated in the deficit zones.

Critical Period

There is no change to the approach to the Critical Period Analysis. Scottish Water 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 that there was 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 14 zones in supply/demand deficit), Scottish Water 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 for the water balance and SoSI calculations and so continues to apply an assumed overall average leakage of 21 m^3/km/day, the figure having been derived historically for potable systems. Trunk main leakage for the 2009/10 water balance is equivalent to about 10.05 m^3/km/day based on the assumption of 0.2m^3/km of main/year of age/year.

The raw water transmission losses 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.

As discussed above, all flow meters covered by the revised 2006-2010 Ministerial Target have been installed and are now operational. However, some meters used for raw water abstraction are installed, with SEPA'S agreement, at the inlet to the WTW and so cannot be used for raw water transmission loss assessment. However a comprehensive dataset was not available during the period to be able to complete a comprehensive review of transmission main and treatment works losses

Scottish Water proposes to evaluate transmission and treatment works losses from:

Metered abstraction – Distribution Input = Transmission pipe + Works losses

During the audit a sensitivity analysis was attempted using flow meter data, raw water mains length and estimated WTW losses. Of three flow meter records, only that for Gorthleck WTW had sufficient data to calculate losses (50m^3/km/day).

Although there are arguments why raw water losses may be greater than potable trunk main losses, we recommend that Scottish Water uses the available data from the raw water flow meters, when operational, to complete a comprehensive estimate of raw water transmission losses for inclusion in future SoSI calculations. The investigation could start with quantifying the losses in a sample of mains feeding zones with resource deficits and long transmission lengths.

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. There are relatively large differences between site specific percentages and generic process values with a trend for the value to reduce where a site specific value has been derived.

The generic values are similar to those used in previous returns. In previous audits we suggested that the generic figures appeared high and are greater than we had observed elsewhere. However, as for outage allowances, published data is variable. For a sample of companies reviewed for AR09, losses varied between zero and 11% with most WRZ in the band zero to 3%. We accept that losses from membrane plants are higher.

Scottish Water responded to the AR09 challenge confirming that it would assess both current assumptions and actual losses for a range of assets where existing metering could be used. As discussed above, although the resource meters became operational during 2009/10, the data were not sufficient to be able to be used for this return. Scottish Water compared generic values for coagulation/filtration and spiral and tubular membranes with published literature and concluded that the generic values were supported by industry wide standards as well as the 2008 data from selected sites (Appendix A to the Scottish Water report). The analysis of 2008 data is summarised as:

Process	SW Report simple average works losses	Flow weighted average losses	Inlet flow range (Ml/d)
Coagulation/Filtration	9.66 %	5.90 %	0.18 - 17.50
Spiral membranes	27.95 %	28.51 %	0.19 – 1.85 (20 hrs)
Tubular membranes	28.85 %	31.84 %	0.04 – 0.52 (20 hrs)

The analysis highlights the inconsistency between sites with similar processes, losses related to works capacities and ranges of losses for works with similar capacities; the underlying conclusion being that more work is required to derive works specific losses to be applied in future supply/demand and SoSI calculations.

The study was supported by a sensitivity analysis reducing high WTW losses by 10% and 25% for sites with losses greater than 10%. The analyses were run on data for 2013/14 and resulted in SoSI point increases of 0.14 and 0.30 respectively spread over five zones. The analysis suggests that changing WTW losses has little impact on SoSI. However we suggest that future sensitivity analyses are carried out on the current dataset rather than forecast data where there is additional uncertainty introduced through projected numbers.

Scottish Water proposes to extend the work to include 2010 data from the abstraction and DI meters and carry out further investigations and analyses. We welcome Scottish Water proposed additional work on WTWs losses and, recognising the marginal difference that the improvements will make to the SoSI, we suggest that the studies be implemented opportunistically as and when other studies are initiated a WTWs in deficit zones.

Notwithstanding the progress made by Scottish Water during 2009/10 and the ability to use data from the abstraction meters we remain of the view that further objective data and analysis is required on this important parameter. In particular, 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 losses with our information.

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 zone from 2007/08 and applied to the DI meter records for the reporting year.

We suggest that Scottish Water reviews its DI records to check that 3% is appropriate. We would like to see an analysis of DI over a number of years to confirm the 3% currently assumed.

Scottish Water uses the corporate DI metering data to derive Peak Week Factors. Following a review of PFs during the period, the factors for 9 WRZs were revised, one was increased and 8 were reduced. The range of factors for the 9 zones before the review was 1.10 to 3.15. The range of the revised factors is 1.17 to 1.36 with one outlying zone, WRZ000274, Kilmelford, at 2.46. The revised range is consistent with our experience, including the outlier where they are rural areas with seasonal populations.

Scottish Water has started to analyse peak factors to remove known operational anomalies, for example isolated events which are not though to be repeatable, burst pipes, from legitimate peak demand. Only sample calculations have been completed to date but we understand that Scottish Water proposes to develop a methodology based on the UKWIR Report for peak estimation driven by corporate databases to calculating peak factors as part of comprehensive integrated process to calculate supply/demand balance and SoSI. This will be an interesting development with repeatable consistency for future annual returns.

Target headroom

There is no change to the methodology and factors used to assess target headroom from previous years.

For the 2008 draft 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). Target headroom uncertainty including and excluding supply side climate change 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 is based on factors derived using the 1998 UKWIR methodology at the megazone level. The megazone analysis results in a 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.

The UKWIR 1998 methodology incorporates an allowance for climate change. However, apart from where the sensitivity of supply side climate change has been considered for the 2003 factors, Scottish Water has stated that the supply and demand calculations do not include a specific allowance for climate change.

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 headroom allowances are acceptable for the current calculations.

Population

The total average resident population in the water resource zones is consistent with the population in Table A2 and used in the water balance.

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.

The SoSI analysis

The Security of Supply Index (SoSI) has been calculated for tables B9a and B9c using contemporary data. Table B9b, titled Security of Supply Index – Reference level of service has not been completed as for previous years and we understand this is with the agreement of WIC. Scottish Water argues that it is not appropriate to use a single return period and difficult to calculate yield calculations to reference levels of service in all 220 WR zones. Scottish Water argues that the 'Reference level' definition (Ofwat 1997 Reassessment of Water Company Yield) is not the same or applicable to Scottish zone characteristics and diversity. Scottish Water believes it is not practical to calculate a return period for Hosepipe Bans to cover all WRZ's and have adopted a L.o.S.s of "a hosepipe ban will be imposed once the process of applying for a Drought Order has been initiated". We understand that WIC has agreed that the reference level of service need not be completed.

Scottish Water assessed that 111 zones are currently in deficit according to supply-demand balance calculations based on Critical Period Demand and 69 are calculated to be in deficit based on Dry Year Annual Average Demand.

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 2009/10 is +19, an improvement of 2 points from 2008/09. The Dry Year Annual Average Index is +25 compared with +26 in AR09. These indices imply that about 26% of Scotland's population (1,320,063) are in deficit based on the critical period.

The closure of Ashgrove WTW due to the quality of the raw water reduced the SoSI score by approximately 4.5 points.

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 and may become more significant in future years when SoSI is included in OPA.

Conclusions

We conclude that:

- Scottish Water has used industry standard methodology and analysis processes as well as a consistent well planned approach. Proposed future integrated processes incorporating datasets from corporate systems appear sensible.

- The SoSI calculation gives a reasonable indication of the current resource situation, but improvements in the quality of some data sets to validate current assumptions should be continued.

- Scottish Water continues to use a 3% increase in demand for the dry year critical period, based on an average used in England and Wales. Accept that it is a difficult parameter to assess, we recommend that Scottish Water reviews the factor in relation to its relevance for Scotland.

- Deficits are small in some zones. It is therefore important that factors and losses (transmission and WTWs) are accurately calculated as they may be material to the SoSI points in the future. We consider that some of the estimated of losses are high. The abstraction meter installation programme provides an opportunity in 2010/11 to improve confidence in the water loss components

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

6. SECTION D – ASSET INFORMATION

6.1 Overview

We have audited the D Tables and found the data in the tables to be consistent with the base data in Scottish Water's systems.

Tables D1 – D3 summarise new, enhanced and replacement assets commissioned in the year for water, wastewater and management and general categories, by number and value

Tables D5 and D6 give physical asset data for water and wastewater projects (including resource planning and drainage studies) reaching commissioning in the year.

Tables D7 and D8 summarise the value of capital maintenance expenditure made in the year for water, wastewater and management and general, by asset type and by Scottish Water region.

Scottish Water has comprehensive and well-managed processes for collecting data from project managers and data systems, applying proportional allocation and compiling the D tables.

For all D tables, commissioning refers to those projects reaching the Beneficial Use stage in the year and the value reported refers to total project cost at the end of the year in which Beneficial Use is reached, apportioned to drivers where relevant. Both Q&S2 and Q&S3a projects are included. Data in the D tables are consistent with those in the G and H tables.

Scottish Water has set reasonable rules for proportional allocation. All Q&S3a projects use proportional allocation in accordance with those rules and proportional allocation should be reviewed at each Capex stage. The same now applies to many Q&S2 projects. The correct allocation of projects and costs to outputs, asset types and Scottish Water regions has generally been confirmed by the audit. However during our audits of Q&S2 and Q&S3a investment projects for the G Tables, we found that for about 25% of the projects audited proportional allocation had not been revisited where project content had changed, resulting in potentially incorrect allocations.

Scottish Water has cleared the backlog in data entry for mains renewals. Historical abandonments continue to be found from operational records but there is no backlog and abandonments are allocated in GIS to the year of disuse.

Scottish Water has now completed its programme of establishing DMAs. Progress on this project has been reported regularly to the Regulatory Leakage Group.

Size bands used in Tables D1 - D3 are consistent with WICS guidance for Table H. The value given in the tables is the value estimated at the end of the year in which commissioning takes place. The data and methodology are consistent with those for previous years.

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 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. In AR06, Scottish Water added 1000km of main sewer which was assumed to exist but which was not yet in the asset inventory and the figure was unchanged until AR09. In AR10 the adjustment has been reduced by 350 km, the estimated length of new discoveries since AR06, and will eventually reach zero.

A further addition of about 16000 km (about 32% of the stock) is made, representing all the lateral sewers known and assumed to exist but not included in the asset inventory. This addition is based on a statistical approach to the likely length of lateral sewer per dwelling of each type. Recalculation has produced a different length each year, reflecting changes in housing type which in practice can have little effect on actual sewer lengths in the ground. We recommend that Scottish Water reviews this procedure, which will otherwise increasingly corrupt the quality of the return data.

Audit of drainage area studies was not required for AR10.

The allocation of projects to water, wastewater and management & general in Tables D7 and D8 was found to be in line with the guidance. This allocation is carried out by the selection of a category from a drop-down menu in the spreadsheet. However this menu allocates terminal sewage pumping stations to sewage treatment assets. We recommend that this allocation is reviewed as many terminal pumping stations will actually be within the sewerage network. The number of regions, the data and methodology used are consistent with those for previous years.

In the draft version of the D7 and D8 tables available at the audit, water capital maintenance was found to be overstated by £43m, while wastewater capital maintenance was understated by a similar amount. This discrepancy, which was corrected for the final version of Tables D7 and D8, is believed to have arisen in processing data for the tables due to errors in allocating certain types of projects to water and wastewater. These figures were amended by Scottish Water, after which Tables D7 and D8 were reconciled with Tables G3a, G3b, G4a and G4b within a small margin of error.

Line D8.28 (water management and general expenditure) shows a figure of -£47.804m. We asked for an explanation of this number and received the following explanation from Scottish Water:

In 2009-10 Scottish Water Solutions delivered some Capital Maintenance, Growth and Customer Services drivers at a higher cost than expected. Drinking Water Quality projects were delivered with efficiencies. Under the pain/gain agreement funds were allocated to these drivers and a net amount agreed with Scottish Water Solutions. The negative allocation to the WSNI driver reflects that expenditure was higher than the contractual funding on this driver.

The negative sum at line D8.28 therefore includes a commercial programme adjustment item and it was entered in the management and general line because it could not be readily split among investment programme areas and regions. This item was not audited as it relates to commercial arrangements between Scottish Water and Scottish Water Solutions. We note that it reflects a commercial adjustment for the whole regulatory period 2006 – 2010 but has only been accounted for in this report year.

In this context, Table G6 contains project 36660 – 'SW Risk Contingency – SWS Programme'. This shows expenditure in no year other than the current report year and shows very large positive and negative percentage allocations. This has the effect of making very substantial adjustments in 2009/10 to the total cost of the drinking water, water capital maintenance and sewer flooding parts of the programme, as indicated in

Table G6. These adjustments include an allocation of –135% to expenditure on water capital maintenance as stated in Table D8. SW has advised us that efficiencies were harder to achieve in the water capital maintenance programme and this has resulted in a disproportionate negative adjustment in this line. The complexities of the positive and negative percentage allocations in this project were one factor in the initial misallocation of water and wastewater capital maintenance in Tables D7 and D8.

Capital maintenance expenditure on sewerage infrastructure and non-infrastructure, sewage treatment, water distribution infrastructure and non-infrastructure, water resources and treatment have all continued to reduce, when compared with AR10. This reflects the substantial completion of these capital maintenance programmes at the end of the investment period.

Confidence grades for Tables D1-D3, D5 and D6 are unchanged from AR09, other than the allocation of grade A1 to zero returns. These confidence grades are generally reasonable, although we continue to suggest that a BX confidence grade would be more appropriate for zero returns.

The confidence grade of B3 allocated to Tables D7 and D8 correctly reflects the potential inaccuracy of proportional allocation, particularly for Q&S2 projects.

6.2 Tables D1, D2 & D3 – Workload Commissioned Assets

Commentary by REPORTER

Introduction

Key Points

- For this report year we have confined the audit to a review of changes in methodology and sample checks on the data to reconcile Table D1, D2 and D3 figures with the base data and other tables in the Annual Return
- The report covers the value of assets reaching Beneficial Use in the report year. For rolling programmes of work this includes the quantity and value of the individual assets commissioned in the report year.
- The commissioned value given in the tables is the value at the end of the commissioning year, not including any later spending or differences between accrued and actual costs.
- The reported information includes Q&S2 completion projects and Q&S3a projects.
- Data are compiled from spreadsheet data returned by project managers. These data are consistent with data on commissioning in the G tables, although they are not compiled directly from Tables G5 and G6.
- The size bands used in Tables D1, D2 and D3 are consistent with the reference tables for Table H. Assets commissioned in the year are reflected in the H tables through changes in asset inventory in Ellipse and GIS, from which the H tables are compiled.
- The reporting of data in Tables D1, D2 and D3 is consistent with that in previous Annual Returns.

Audit Process

During the audit we reviewed:

- The sources of data on the workload of commissioned assets
- The methodology for compiling the table from each data source
- The allocation of costs to service, capital maintenance and size band
- The consistency of data with that reported in G and H tables

We checked sample lines in the tables to confirm the audit trail back to the base data and consistency with the WIC grades used for size bands. We also checked a small number of projects in the Table D1 and D2 base data to check that commissioning was confirmed by Capex paperwork and data in Tables G5 and G6.

The audit was carried out by interviewing members of Scottish Water's staff responsible for the compilation of the tables and with direct, unrestricted access to data held on Scottish Water information systems.

Methodology

There have been no changes in the methodology or sources used for collecting data on the workload of commissioned assets. As in previous years, Scottish Water collected information on commissioned assets for the AR10 return directly from project teams and other areas of the business. The reported information includes both Q&S2 completed projects and Q&S3a projects. Data collection is focussed through a single team and guidance is provided on matching assets to asset codes. Allocation of asset to asset types is by use of WIC codes.

Tables D1 and D2

Information for Tables D1 and D2 is compiled annually from 5 areas of the business:

- Scottish Water Solutions, Capital Investment Delivery Team and Quick-wins projects
- Operations reactive projects
- Mains and sewer rehabilitation projects
- Adoptions
- Miscellaneous other projects

Information was collected from these areas as follows:

<u>Scottish Water Solutions, Capital Investment Delivery Team and Quick-wins Projects</u>

A spreadsheet template was issued by Asset Information and Management (AIM) for completion by project managers. This template was a download of CIMS data for projects reaching Beneficial Use in the year and included dropdown menus for WIC grades and Ellipse asset codes and X-factors, as well as the project list. The project manager entered the asset category, WIC grade, X-factor and cost (apportioned in line with rules for capital allocation). Project managers and others were also asked to make adjustments for any under- or over-reporting in previous years.

The data were then uploaded by AIM into a standalone database, recording the originator and date of the update, where they were amalgamated with data from the other business areas. An Access query was used to map capacity data onto size bands and to produce the Table D1 and D2 lines directly. AIM carries out checks to confirm that the total costs shown in the project managers' returns correspond to CIMS data, from which Tables G5 and G6 are derived.

<u>Operations Reactive Projects</u>

As for AR09, reports were provided by Finance in a spreadsheet covering six areas of work: water non-infrastructure, wastewater non-infrastructure, mains, sewers, lead communication pipes and other communication pipes. Information on the work content was derived from WAMS and costs were provided from the job cost on PeopleSoft. These data were stated by asset category, in size bands consistent with the H tables, and by Scottish Water area. It was assumed that all work on sewers was on non-critical sewers. The spreadsheet data were uploaded into the standalone Access database used for data from other business areas and then processed as above.

Mains and Sewer Rehabilitation

Data were provided by the Capital Investment Delivery (CID) team. The methodology is unchanged from that used for AR09. CID made a spreadsheet return on work carried out, listing for each project the diameter, work type, location and length. Costs were calculated using a unit cost approach applied to the work volumes in the year (projects may span more than one year) so that the actual project costs were spread across the relevant assets.

For mains, the CID return distinguished between potable mains, lead communication pipes and other communication pipes. For communication pipes, the material and whether short or long side were given. Requested information on sewer criticality was not provided and instead it was assumed that any sewers under 600mm in diameter were non-critical. It was also assumed that no rising mains were included.

Adoptions

Spreadsheet information was provided by Customer Connections (CC) at a site-by-site level, identifying size bands and corresponding costs. The costs given for adopted assets corresponded to the cost to Scottish Water of the contributions made to developers, plus Scottish Water's fees. The information was provided by CC. This cost will be less than the construction cost of the assets in question, which are constructed at the developer's cost and offered for adoption.

Miscellaneous Other Projects

This category applied to only two projects in the report year where projects were being managed by a project manager not attached to one of the usual delivery vehicles. Information was provided by the project manager on an individual basis.

Table D3

The methodology for compiling this table is generally as AR09. Data were provided by the following business areas:

- Facilities (offices, labs, depots, workshops and control centres)
- Logistics (vehicles and plant)
- The Telemetry Manager (telemetry)
- IT (information systems)
- Estates and CID (other non-operational assets)

Data were collected on a copy of Table D3 sent out by AIM, in place of the spreadsheet used last year, and manually merged into Table D3 for the Annual Return. Guidance on completion was also available to the project managers if requested. The commissioning date used was either the Beneficial Use date or the date of purchase. Project costs included overheads and were in money of the day. Entries for 5 sample lines in Table G3 were examined and reconciled with data returned by project managers.

There is no longer a risk of double counting of Support Services assets, since these are reported separately in Table D3 and not apportioned to water or wastewater services.

General Considerations for Tables D1 – D3

Tables D1 to D3 are consistent with Tables G5 and G6 as both use the same basic data from CIMS, although D1 to D3 are not compiled directly from G5 and G6. Tables D1 to D3 are also consistent with the H Tables as they use the same asset types and size bands.

Assets were allocated to asset types which are consistent with the table line definitions. Where investment in a treatment works resulted in a change of type, investment was reported against the revised asset type. Commissioned assets were reported as corresponding to projects reaching Beneficial Use in the report year, or to the date of purchase if a purchased item. Beneficial Use dates claimed by project managers were reconciled by AIM with those shown in CIMS. Where a project covered a rolling programme of work (for example asset maintenance or vehicle replacement) the quantity and value of assets completed in the report year was included in the return.

The reported value related 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 was consistent with the quantity of asset commissioned in the report year.

For projects forming part of rolling programmes, the value of commissioned assets was captured, including actual costs to the end of the report year. For projects not part of rolling programmes, the value of commissioned assets was captured including actual costs to the end of the report year, plus forecast future costs including any accruals or other provisions. Where future costs prove to be different from those forecast this will result in a small error in the reported values, but this is likely to be insignificant. 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 and so will have very little effect on the accuracy of reported values year on year.

The project teams allocated 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 were later 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. Size bands used were compatible with those used in Table H. Information reported in D tables is generally consistent with the H tables and takes into account newly commissioned assets. However the source data for H tables were drawn principally from GIS and Ellipse and so are dependent on timely updating of those systems following the commissioning of a new asset.

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.

Conclusions

Data in Tables D1, D2 and D3 are consistent with data on commissioning in the G tables, although they are not compiled directly from Tables G5 and G6. The data are also consistent with those in previous Annual Returns.

We confirmed by reviewing sample projects that the allocation of assets to asset types is by use of WIC codes. This is consistent with the rules for capital allocation where WIC grades are also used. Checks on sample lines confirmed that size bands used for Tables D1, D2 and D3 are consistent with the guidance for Tables H2 – H6.

Sample checks were made on six lines in Tables D1 and D2 and the data were found to be consistent with the data listed in the standalone database summarising the base data.

Some small potential for miscoding arises with CSOs as work on these has been included within the sewers category. Another area where data are believed to be incomplete relates to the 'Quick Hits' programme. These inconsistencies are reflected in the confidence grades.

From our audit we concluded that Scottish Water has a thorough and well-managed process in place for collecting base data direct from project managers and compiling Tables D1 - D3. Data checks showed the entries in the tables to be compatible with base data.

It was noted that information on Support Services assets was manually entered into Table D3, which gives rise to some potential for human error. There is no longer a risk of double counting of Support Services assets.

Comments by Line

Line D1.18: Replacement air-valves are reported at line D1.18, size band 1. The costs of new air valves are included in mains at line D1.47.

Line D1.48 The assessed value of cathodic protection work is reported at line D1.48 under commissioned value, size band 1. No corresponding physical asset is reported on this line

Lines D3.7 – 8, 27 - 28: The report tables do not make provision for a report of changes in asset stock for vehicles and plant.

Lines D3.13 – 16, 33 - 36: The report tables do not make provision for a report of changes in asset stock for other non-operational assets.

Comments by Confidence Grade

There have been no changes to confidence grades, compared with AR09, other than the allocation of grade A1 to zero returns. We believe that these confidence grades are generally reasonable, although we continue to 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. With this qualification we support the confidence grades allocated.

6.3 Table D5: Activities - Water Service

Commentary by REPORTER

Introduction

Key Points

- We have audited the process for extracting water main data from Scottish Water's GIS database and reviewed changes during the year. We reviewed capital intervention data from CID's Primavera P6 project control software. We audited the production of the Table figures from base data and examined a small sample of four projects.

- The lengths of mains relined, renewed or new mains laid for quality reasons can be calculated from Scottish Water's capex drivers. However, Scottish Water does not report separate figures on these or the non-quality lengths. Scottish Water did not replace any lead communication pipes for quality reasons in the year.

- The proportion of reline to rehabilitation has changed by more than 10% from the same proportion in AR09. Scottish Water states that its policy on relining or replacement is based on asset condition grade as determined by pipe samples on the intervention length. The policy is long-term and unchanged.

- The opening balance for the total length of water mains is the closing balance from the return of AR09.

- Most new mains are added as a result of developers' activity.

- The bulk of capital intervention work on water mains is carried out by Scottish Water Solutions (Scottish WaterS) and Scottish Water Capital Investment Delivery (CID), who manage associate delivery partners (ADPs). The figures are derived directly from the control spreadsheets with added smaller lengths from reactive operational activity.

- Scottish Water's closing balance of mains length is derived every year from the GIS asset information.

- Confidence grades for the mains asset balance are considered reasonable. However, the B2 grade for the closing balance in line 8 seems understated considering it to be derived from the company GIS with a balancing line (7a) of only 0.44% of the total mains length.

- 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. In the Water Resource Planning tables percentage property coverage is used as a surrogate for percentage population coverage.

- 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 95.1% of population. The figures reported in the table relates to the year-end position and not an average position.

- We concluded that data on the mains asset balance are reliable and accurate within the confidence grades assigned and that data reported on the DMA programme are robust.

Audit Process

During the audit we met with the operators and data extractors of Scottish Water's GIS database for water mains infrastructure. We saw the results of the extractions and discussed how alterations had been carried out through the year.

We also met the operator of CID's Primavera P6 project control software, which is used to produce capital intervention data from CID. We inspected the list of mains from capital intervention investment works in the year, and saw how the numbers were collated and fed through a summary spreadsheet into the Table figures. We also examined a small sample of four projects. All completions claimed are within AR10.

Methodology

Mains Asset Balance

The opening balance for AR10 is the closing balance for AR09. The closing balance for AR10 is measured directly from Scottish Water's GIS water mains records, as in previous years.

For AR10 Scottish Water has derived data on lengths of mains renewed, relined, newly laid and abandoned from the P6/Primavera project planning and control software used by CID. All delivery partners or contractors are included in the management package and data are collected weekly for monthly management reporting. At the end of a project and at the year-end, the actual delivered mains lengths data is down-loaded and entered to a spreadsheet for the whole of Scottish Water, and the result transferred to the Annual Return.

All Scottish Water's capital intervention is carried out under its various business drivers, of which quality is an identifiable subset. It would therefore be possible for Scottish Water to provide a breakdown by driver of the year's mains production but the separate figures are not required in the return.

The Primavera system is also linked to Capex 5 forms for project completions and to properly submitted data and record drawings from the contractors on a weekly and monthly basis, linked to payments. Completion is defined as acceptance by Scottish Water Operations. There may be a small lag between operational acceptance and entry to GIS, but we understand this is limited to a few days.

The proportion of reline to rehabilitation has changed from 4.29% in AR09 to 6.86% in AR10. As this change is more than 10% we queried Scottish Water's policy on relining or replacing. Scottish Water states that its policy on relining or replacement is based on asset condition grade (1, 2, 3 - reline and 4, 5 - replace) as determined by pipe samples on the intervention length. This policy is long-term and unchanged.

Scottish Water's mains flushing for quality purposes data (Line D5.5) is derived from the CID mains cleaning programme driven mainly by the iron and manganese quality standards. Mains cleaned for other purposes is derived from WAMS and added to give the total cleaned length in Line D5.4.

Abandonments are those lengths actually abandoned in the year. There has been no backlog of historical abandonments to be claimed and mains lengths abandoned are now allocated in GIS to their year of disuse.

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 Plus (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 are not routinely updated after the initial entry. Consequently DMA data on PSP may become out of date with the actual metrics over time. Scottish Water has 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 report year, Scottish Water has completed its programme of DMA establishment. 147 additional DMAs were set up in the reporting year compared to 770 additional in the previous year. The current figure of 2773 DMAs includes a number of TMAs (Trunk Main Areas). TMAs are different to standard DMAs as 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 percentage coverage. We believe that the use of this surrogate is acceptable.

Conclusions

Mains Asset Balance

The mains asset data is taken anew each year by direct interrogation of the GIS database. As such, this is as close to the company's record working as possible and the approach is commended.

The lengths reported for work done on the network are taken from Scottish Water's investment data by information fed directly from capital investment sections and the control at the end of year is reasonable. We therefore believe the return figures to be reasonably reliable and accurate.

The use of line 7a to hold both historical errors and the balance between annual length assessments is therefore logical and reasonable. This line represents a variance of 0.44% of the total water mains stock. The figure has varied from year to year around ± 200 km since AR07.

Water Resource Planning

We believe that the data reported on the DMA programme are robust.

Comments by Line

Line 1:	The opening balance of mains length is equal to the closing balance from AR09, 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:	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 information held in CID's Primavera project control software. Capex 5 approval and the corresponding payments are withheld from contractors until these data have been provided.
Line 7a:	As Scottish Water generates the total length of mains from GIS each year, this line is used to reconcile any differences which effectively arise from better information on water infrastructure assets.
Line 8:	Scottish Water generates the total length of mains each year from the GIS data.
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. The DMA programme is now complete but Scottish Water may show small variances in future years as DMAs are rationalised in the light of experience. Given other reporting mechanisms available to WICS through the Regulatory Leakage Group WICS may consider that in future years this block of lines need not be reported.
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 81.6% 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. Line 15 is calculated as Line 16 for the reporting year minus Line 16 for the previous year 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 Regulatory Leakage Group and they 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. The total number of connections in Scottish Water is taken from the number of communication pipes in lines H3.6 and H3.7.
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

Lines 1 & 8:	Scottish Water generates the mains total lengths directly from GIS each year. We agreed grade A1 to be reasonable for the closing balance in AR09 and therefore the same grade is supported for AR10.
Lines 2 - 3	Lengths are taken from the CID Primavera contract control data, and we believe that the grade of A2 is reasonable.
Lines 4 - 5	Lengths are taken from WAMS where resolution coding could possibly be improved; a grade of B3 is considered reasonable.
Lines 6 - 7	Lengths are taken from the CID Primavera contract control data and GIS for the developers new mains, and a grade of B2 is considered reasonable.
Line 8:	Scottish Water has claimed a confidence grade of B3 in AR10. As noted for line 1, the figure is generated from GIS in the same way every year and we would have expected a similar grade to AR09, when B2 was allocated. Line 7a, which is the balancing item between the two years, is only 0.44% of the total mains length.
Line 7a:	Line 7a includes an element of balance between the GIS trawls for AR08 and AR09, and a confidence grade of B2 would be reasonable.
Lines 9 - 11:	Lengths include those replaced by reactive operational work recorded on WAMS. For lines 4 and 5 we noted that mistakes can be made in WAMS resolution codes, but as replacement of communication pipes should be less prone to error, we accept the same grades as in AR09.
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. Averaging occupancy rates over large numbers of households will tend to reduce the potential discrepancy

Scottish Water has reduced the confidence grade in Line 17 from an A3 to a B4. Scottish Water has based its calculations on an estimate of connections rather than simply properties. Any estimate of connections rather than properties is less accurate. The accuracy is difficult to assess. We accept that there is some adjustment to recorded figures and so accept the B4 grade.

We are unsure whether WICS meant Scottish Water to undertake its calculation on the basis of connections rather than properties, but note that properties are taken as a surrogate for population in Line 15.

Scottish Water has increased the confidence grade in Line 18 from an A3 to an A2. We accept that this figure, sourced from Scottish Water's leakage control computer system using downloaded data from the GIS system should be accurate and accept the revised grade.

6.4 Table D6: Asset Performance and Activities – Wastewater Service

Commentary by REPORTER

Lines 1 to 13; Critical /Non-critical Sewers

Introduction

Key Points

- We have audited the process for extracting sewer data from Scottish Water's GIS database and reviewed changes during the year. We reviewed capital intervention data from CID's Primavera P6 project control software. We audited the production of the Table figures from base data and examined a small sample of two projects. An audit of Drainage Studies was not required in AR10.

- An addition has again been made to reported sewer stock to account for sewers believed to exist but not recorded on GIS. For AR10 this addition has been reduced to 650 km, to take account of discoveries made since AR06 when the initial assessment was made.

- The assessment of the length of lateral sewers has again been made on a statistical basis, using house type and an assessed lateral length per house. We recommend that Scottish Water reviews the procedure for including laterals in the Annual Return and take steps to obtain real lateral data which is known to exist in some areas, as well as entering lateral data onto GIS as these lengths are discovered.

- 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 AR09 return.

- 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 sewer lengths. 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 AR09 report for Table H4. It is not included in our commentary on the H tables for AR10 as only a high-level audit of the H tables was undertaken for AR10.

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

- We concluded that a robust approach is taken to the assessment of critical sewer length, calculating this from GIS each year. Scottish Water's procedures for the calculation of sewer lengths are reasonable, although the calculated additions for off-inventory and lateral sewers affect the confidence grades allocated.

- Confidence grades for lines D1 to 13 proposed by Scottish Water are generally reasonable for their respective lines. Although the figure in Line 13 contains a total allowance of about 16 700 Km of off-inventory main and lateral sewers, the claimed grade is still reasonable.

Audit Process

In the audit we met with the operators and data extractors of the GIS database on which the infrastructure is recorded. We saw the results of the extractions and discussed how changes had been made to the data during the year.

We also met the operator of CID's Primavera P6 project control software, which is used to produce capital intervention data. We inspected the list of mains from capital intervention investment works in the year, and saw how the numbers were collated and fed through a summary spreadsheet into the table figures. We also examined a small sample of two projects. All completions claimed are within AR10.

Some historic sewer abandonments are still being discovered, and these are included in Lines D6.7a and D6.12a for other changes to sewers because they are recorded in GIS with their actual date of abandonment and were not abandoned in this report year.

A summary of the sewer inventory balance was provided to show changes in AR10 compared to AR09 and to demonstrate some of the detail behind the return line figures. These were consistent with the details provided earlier.

As the GIS is interrogated every year, any differences unaccounted for by the stated adjustments are included in Lines D6.7a and D6.12a.

Methodology

All Scottish Water's infrastructure assets are recorded on a GIS database which uses an Ordnance Survey background map. The data can be interrogated throughout the company down to site level, where operators have handheld computers with this functionality.

Every year the GIS is interrogated for the annual return with the data as at year-end, but with a short period allowed for last-minute completions or deletions from the investment programme and from operational changes. Consequently the final year-end statement is directly assessed from the sewer records with two additions:

- Adjustment for off-inventory sewers. An assessment in AR06 showed that when compared with the list of sewered properties and their proximity to a sewer, around 1000Km of sewer should be added. This was assumed to be 50Km of critical sewer and 950Km non-critical, and was not adjusted in AR07, 8 or 9.

  In AR10, Scottish Water reduced the 1000Km downwards by newly discovered sewerage in the four years since AR06. The adjustment length of off-inventory sewer is now 650Km, all non-critical. We approve this move and note that the adjustment will reduce to zero in maybe 10 years' time.

- Adjustment for lateral sewers. On a sample basis, Scottish Water assessed the lengths of lateral sewer it should own by property type and hence estimated the total length of laterals using total property numbers by type. This calculation is repeated every year on the basis of numbers of property types taken from published local authority data. The adjustment represents about 32% of the total sewer stock.

As the housing stock varies with development every year, the calculated length of lateral sewers also varies, and this year's length of 16344Km is 59Km less than AR09's figure. In AR09 we were told that Scottish Water did have the majority of the City of

Edinburgh's lateral sewerage marked on paper plans rescued from the local authority as it no longer had need to retain these. We were told that digitisation for input to the sewer record could not be automated and would therefore need more expensive manual inputting.

Also in AR09 we were able to interview network operators who demonstrated how to enter lateral sewers on the GIS by "red lining" a discovered sewer line (main or lateral), although without level or depth information.

In AR10 we discussed with the GIS operators how developers' sewerage was adopted by Scottish Water without the lateral sewer data being transferred to Scottish Water's databases.

The assessment of Scottish Water's lateral sewerage length is consistent with last year's and uses the same methodology and local authority annual source data of dwelling types. The 59Km reduction is a statistical variation, rather than a reflection of actual sewers being abandoned, and is 0.36% of the lateral sewer stock.

We asked for a copy of the management decision that lateral sewers should not be included in the GIS databases. We were given the following statement:

"Information on lateral sewers could be collected as part of a data capture exercise, or by Operations staff as they attend chokes or collapses. The first option would be expensive and difficult to justify given other priorities as well as when weighing up limited budget versus business benefits. The second option would be less costly but, in order to capture enough data to improve on the current statistical calculation, would take many years to achieve. However, a business case is currently being raised to provide the field staff with the ability to update the GIS direct when on-site; this will include the collection of information on lateral sewers but there is no guarantee that this will get approval to proceed."

For AR10 Scottish Water has derived data on lengths of sewer renewed, relined, newly laid and abandoned from the P6 Primavera project planning and control software used by CID. All delivery partners or contractors are included in the management package, and data are collected weekly for monthly management reporting. At the end of a project and at the year end the actually-delivered sewer length data are down-loaded and entered to a spreadsheet for the whole of Scottish Water, and the result transferred to the annual return.

The Primavera system is also linked to the Capex 5 forms for project completions and to properly submitted data and record drawings from the contractors on weekly and monthly bases, linked to payments. Completion is defined by acceptance by Scottish Water Operations. There may be a small lag between operational acceptance and entry to GIS, but we understand this is limited to a few days.

Abandonments are those lengths actually abandoned in the year. There is no backlog of historical abandonments to be claimed, and sewer lengths abandoned are now allocated within GIS to their year of disuse.

Conclusions

The closing balance of <u>critical</u> 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).

Accordingly, we believe that the "Other Change" lines D6.7a and D6.12a are correctly used to reconcile all other adjustments.

The closing balance for all sewers is based on the total length of sewer in GIS, plus a further 650Km length of main sewer, assumed to exist but not yet included in the asset inventory, together with an allowance of about 16000Km representing lateral sewers, which are known to exist but are also not included in the asset inventory. The methodology was first carried out in the AR06 return.

- The 1000 km of main sewer was reasonably added (assumed to exist but not recorded) in 2006. From AR10 any new discoveries are added into the GIS with a corresponding reduction in the 1000 km allowance. We believe this to be a sensible move and note that the allowance (now 650Km) will eventually disappear.

- 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 again annually to AR10. 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 different length each year, from 15364km in AR06 by stages to 16344Km in AR10. The changes reflect the changes in housing type from published local authority data which can have little effect on actual sewer lengths in the ground.

We continue to recommend that Scottish Water review these two procedures.

We commend action taken by Scottish Water in AR10 to reduce the lengths of critical and main sewer included off-inventory by the length of new discovery since the procedure began in AR06.

We believe that there would be benefit in reviewing the procedure for including the length of lateral sewer in the asset database. We again recommend that Scottish Water review this procedure, which we believe will increasingly corrupt the quality of the return data. We believe that appropriate asset data are fundamental to the running of the business and recommend that the business case referred to above for improvement to the lateral sewerage data is carefully considered. We recommend that Scottish Water develops a plan for asset information improvement even if it involves the very long term.

The definition of a lateral sewer in Scotland is consistent with water supply practice in that the pipe between the main sewer and the property boundary belongs to Scottish Water. The English and Welsh definition in the nearest equivalent case of a so-called Section 37 sewer is that the sewerage authority is responsible only for pipes serving more than one property.

It is our opinion that a direct comparison of Scottish Water and English and Welsh sewerage undertakings for sewer length is unreliable while the Scottish Water's length includes lateral sewers. This opinion is based mostly on the difference in definition for Scottish assets and partly on the nature of the lateral sewer length calculation.

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. 79 km of new critical sewer were added this year compared to 13 km in AR09, 39 km in AR08 and 22 km in AR07.
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 that no sewers were renovated this year.
Lines 6 and 11:	Scottish Water is reporting a total replacement length of 12.65 km for critical and 15.5 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 are negative reconciliatory figures to enable the figures in the D6 table to summate to the known opening and closing balances. We note that the 350 km reduction in off-inventory sewer length accounts for most of the value given in line 12a.
Line 8:	The closing balance for the length of critical sewer is 11502 km, which is based on GIS at the year-end and contains no off-inventory sewer length.
Line 13:	The closing balance of 50086 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.
Lines 14 - 19:	These lines were not audited for AR10.

Comments by Confidence Grade

Line 1:	Scottish Water has proposed C4 for the opening balance. This is the figure reported last year as the closing balance of all sewers in Line 13 and given a confidence grade of B3. As the closing balance contains about 16000 km of estimated lateral sewer, the revised grade of C4 is reasonable.
Line 2:	This is the same total as the closing balance for critical sewers in AR09 and carries the same confidence grade of B2.

Lines 3 to 5 and 7:	These lines are derived from company Capex spreadsheets with additions from operational activity. The allocated confidence grade of B2 is reasonable.
Line 6:	This line is derived from company Capex spreadsheets. The allocated confidence grade of A2 is reasonable.
Line 7a:	As this is the adjustment line where the above lines are reconciled a confidence grade of B3 is reasonable.
Line 8:	This line is generated from the company GIS system and this year has no adjustment for off-inventory sewers. However, Scottish Water have claimed a lesser confidence grade of B3 compared with B2 in AR09
Line 9:	This line is derived from company capex spreadsheets with additions from developers' data, a confidence grade of B2 is reasonable.
Line 10 to 12:	Figures for non-critical sewers renovated, replaced or abandoned are generated from capex spreadsheets and operational data and a confidence grade of B2 is reasonable. Scottish Water has claimed A2 for non-critical sewers replaced.
Line 12a:	This is the adjustment line where the above lines are reconciled from company spreadsheets and a common assumption with previous years for lateral sewers. A confidence grade of B3 is reasonable.
Line 13:	The closing balance is derived from the company GIS system with a reduced allowance of 650 Km of off-inventory main sewers and 16000 Km of laterals. Scottish Water has claimed a confidence grade of B3 which is reasonable.
Lines 14 to 19:	These lines were not audited for AR10.

6.5 Tables D7 and D8: Wastewater and Water 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 AR09.
- Scottish Water has reported on the basis of 8 operational areas. These areas are unchanged from AR09.
- The tables show expenditure made on all projects in the year 2009/10, rather than expenditure on projects commissioned in 2009/10.
- The tables are compiled from project-specific data, where the operational area, proportion of cost allocated to capital maintenance, asset type and split between water, wastewater and management & general are all allocated to each project by the project manager before summation for the table totals.
- Scottish Water has set rules for proportional allocation. These are reasonable and are consistent with those used in the past. Prime purpose allocation is not used.
- The allocation of costs to drivers was initially different for Q&S2 and Q&S3a projects. For Q&S2 projects allocation was initially made equally to all drivers, while for Q&S3a, project managers allocated costs to drivers based on their knowledge of the project, using an assessment of the actual cost of meeting each driver. Many Q&S2 projects have now had proportional allocation revisited using Q&S3a rules.
- 22% of Q&S2 projects and 32% of Q&S3a projects have more than one driver and so have proportional allocation applied. These proportions were similar in AR09.
- During our audits of Q&S2 and Q&S3a investment projects for the G Tables, we concluded that generally the rules were followed. However we found that for about 25% of the projects audited proportional allocation had not been revisited where project content had changed, resulting in potentially incorrect allocations.
- The allocation of projects to water, wastewater and management & general was found to be in line with the guidance. This allocation is carried out by the selection of a category from a drop-down menu in the spreadsheet. This menu allocates terminal sewage pumping stations to sewage treatment assets. We recommend that this allocation is reviewed as many terminal pumping stations will actually be within the sewerage network.
- In the draft version of the D7 and D8 tables available at the audit, water capital maintenance was found to be overstated by £43m, while wastewater capital maintenance was understated by a similar amount. This discrepancy, which was corrected for the final version of Tables D7 and D8, is believed to have arisen in

processing data for the tables due to errors in allocating certain types of projects to water and wastewater. After amendments by Scottish Water, Tables D7 and D8 were reconciled with Tables G3a, G3b, G4a and G4b within a small margin of error.

- Line D8.28 (water management and general expenditure) shows a figure of minus £47.804m. We asked for an explanation of this number and received the following explanation from Scottish Water:

  In 2009-10 Scottish Water Solutions delivered some Capital Maintenance, Growth and Customer Services drivers at a higher cost than expected. Drinking Water Quality projects were delivered with efficiencies. Under the pain/gain agreement funds were allocated to these drivers and a net amount agreed with Solutions. The negative allocation to the WSNI driver reflects that expenditure was higher than the contractual funding on this driver.

  The negative sum at line D8.28 therefore includes a commercial programme adjustment item and it was entered in the management and general line because it could not be readily split among investment programme areas and regions. This item was not audited as it relates to commercial arrangements between Scottish Water and Scottish Water Solutions. We note that it reflects a commercial adjustment for the whole regulatory period 2006 – 2010 but has only been accounted for in this report year.

  In this context, Table G6 contains project 36660 – 'SW Risk Contingency – SWS Programme'. This shows expenditure in no year other than the current report year and shows very large positive and negative percentage allocations. This has the effect of making very substantial adjustments in 2009/10 to the total cost of the drinking water, water capital maintenance and sewer flooding parts of the programme, as indicated in Table G6. These adjustments include an allocation of –135% to expenditure on water capital maintenance as stated in Table D8. SW has advised us that efficiencies were harder to achieve in the water capital maintenance programme and this has resulted in a disproportionate negative adjustment in this line. The complexities of the positive and negative percentage allocations in this project were one factor in the initial misallocation of water and wastewater capital maintenance in Tables D7 and D8.

Audit Process

During the audit we reviewed:

- Sources of data on capital maintenance expenditure.
- Scottish Water's methodology for allocating projects to water or wastewater, management & general, regions, asset types and capital maintenance.
- The methodology for data collection and table compilation.

By audits of specific projects, we checked that the proportional allocation of investment project expenditure conformed to Scottish Waters proportional allocation guidelines.

By checks on the base data we audited the selection by data providers of operational area, project drivers, work type and the split between water, sewerage and Management &

General. We also checked the reconciliation of Tables D7 and D8 with Tables G3a, G3b, G4a and G4b.

The audit was carried out by interviewing members of Scottish Water's staff responsible for the compilation of the tables and with direct, unrestricted access to data held on Scottish Water information systems.

Methodology

The tables show capital maintenance expenditure made on all projects in the year 2009/10, rather than just expenditure on projects commissioned in 2009/10.

The methodology used by Scottish Water is the same as that used in AR09. Project managers are responsible for entering or checking and confirming all of the data, including proportional allocation. Rules for proportional allocation of project costs are unchanged.

Data were downloaded from the Capital Investment Management System (CIMS) into a single spreadsheet for both Q&S2 projects and Q&S3a projects, immediately after the freezing of financial data in early April 2010. Operational area, capital maintenance proportions, function and infrastructure/non-infrastructure proportions were pre-populated. Proportions were then checked by project managers for each project as described below and the spreadsheet returned for summation to give the table lines. Project managers were given written guidance and also provided with drop-down spreadsheet menus to assist them in defining asset categories and allocating projects with a capital maintenance element to operational areas.

Allocation of Projects to Operational Areas

Reporting is on the basis of 8 operational areas, unchanged from AR09. 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 were rationalised to 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. Information on which Scottish Water region a project falls into is included in CIMS data.

As part of the data collection exercise project managers were asked to confirm the operational area for each project using a dropdown menu in the spreadsheet. For Scotland-wide projects, project managers apportioned total project cost to the relevant operational areas, making a precise split where possible. For linear projects (such as water mains) crossing operational area boundaries project managers were also asked to apportion cost to the relevant two 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. Allocation to capital maintenance was carried out in accordance with Scottish Water's Capital Allocation Guidelines, last updated in January 2008. All projects were assessed for the percentages to different capital drivers at Capex 1 stage, before detailed costs were known.

For Q&S2 projects, the rules in force at that time required that expenditure should be allocated equally between all of the project drivers, irrespective of the cost of meeting each driver. A review of the allocation of costs to drivers for the Q&S2 project was undertaken in support of the planning for SR06. The proportional allocation of costs to drivers was revisited during 2007/8 for completed Q&S2 capital maintenance projects.

22% of Q&S2 projects (as reported in Table G5) have more than one driver and so have proportional allocation applied.

For Q&S3a projects, Capital Allocation Guidelines 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 Capex 1 stage to construction. For Q&S3a projects, costs were allocated to drivers in proportion to the project manager's estimate of the cost of meeting that driver.

32% of Q&S3a projects (as reported in Table G6) have more than one driver and so have proportional allocation applied.

Starting with calculations made in 2008/9, the percentage allocated to capital maintenance is now calculated to the nearest 1%, rather than being rounded to the nearest 5% as previously.

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 generally uncontroversial. Some management and general projects cover both water and wastewater and these are allocated to the two services by the project manager, making a precise split where possible. The allocation of projects to infrastructure or non-infrastructure follows the rules given in the Annual Return Reporting Requirements. The selection of a particular work type in the spreadsheet drop-down menu automatically confirms the allocation to infrastructure or non-infrastructure.

Management and General

The allocation of projects to this category follows the definitions in the Annual Return Reporting Requirements and is one option in the spreadsheet drop-down menus. 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, although a precise split is made where possible.

Conclusions

Scottish Water has set rules for proportional allocation. These are reasonable and are consistent with those used in the past. During our audits of Q&S2 and Q&S3a investment projects for the G Tables, we concluded that generally the rules were followed. However we found that for about 25% of projects audited proportional allocation had not been revisited where project content had changed, resulting in potentially incorrect allocations. Our findings are described more fully in our commentary on Tables G5 and G6.

Information is collected on a project-specific basis and prime purpose allocation is not used. The number of regions reported upon and procedures for expenditure allocation are both consistent with those used for AR10.

22% of Q&S2 projects (as reported in Table G5) have more than one driver and so have proportional allocation applied. 32% of Q&S3a projects (as reported in Table G6) have more than one driver and so have proportional allocation applied. These percentages are similar to AR09.

During the audit the allocation of costs to operational area was reviewed for 6 sample projects including management & general projects, which were assessed as covering more than one operational area. Some were split equally between 8 areas, but it was concluded that an accurate assessment had been made of the actual cost split where this was not the case.

We also checked four sample projects to confirm that the allocation of costs to drivers used in the compilation of Table G7 and G8 corresponded to the information in the latest Capex form. This was found in every example to be the case.

The allocation of projects to water, wastewater and management & general was checked for a number of sample projects and was found to be in line with the guidance. This allocation is carried out by the selection of a category from a drop-down menu in the spreadsheet. It was noted that this menu allocates terminal sewage pumping stations to sewage treatment assets. We recommend that this allocation is reviewed as many terminal pumping stations will actually be within the sewerage network.

The completed spreadsheets are returned by project managers to AIM where they are manually compiled to give the figures in Tables D7 and D8. This gives rise to the potential for human error.

Scottish Water stated that total capital maintenance in Tables D7 plus D8 was reconciled with total capital maintenance expenditure in Tables G5 plus G6. This was not checked. However water capital maintenance expenditure in Table D8 was compared with the total of capital maintenance in Tables G3a and G4a. Similarly wastewater capital maintenance expenditure in Table D7 was compared with the total of capital maintenance in Tables G3b and G4b. In the draft version of the D7 and D8 tables available at the audit, water capital maintenance was found to be overstated by £43m, while wastewater capital maintenance was understated by a similar amount.

This discrepancy, which was corrected for the final version of Tables D7 and D8, is believed to have arisen in processing data for the tables due to errors in allocating certain types of projects to water and wastewater.

In addition, Table G6 contains project 36660 – 'SW Risk Contingency – SWS Programme'. The drivers are allocated as follows:

DW3 (Drinking Water Directive)	+275.2%
WG1 (Water Growth)	-5.1%
WSNI (Water Non-infrastructure)	-135.0%
CS11 (Sewer flooding)	-35.1%

These drivers total 100%, but the large positive and negative percentage allocations have the effect of making very large adjustments to the total cost of the drinking water, water capital maintenance and sewer flooding parts of the programme, as indicated in Table G6. They also account for the large negative figure seen at line D8.28 (Water management & general).

The adjustments in project 36660 reflect a view by Scottish Water of the likely outcome of pain/gain payments in its contract with Scottish Water Solutions. This is discussed in more detail in our commentary on Table G5 and G6 risk reserves. The allocations in this project were one factor in the initial misallocation of water and wastewater capital maintenance in Tables D7 and D8, although other errors were found by Scottish Water during checks after the audit.

Following Scottish Water's amendments to Tables D7 and D8, these were reconciled with Tables G3a, G3b, G4a and G4b to within £0.111m, indicating that some minor misallocations remain in the two D tables.

Capital maintenance expenditure on sewerage infrastructure and non-infrastructure, sewage treatment, water distribution infrastructure and non-infrastructure, water resources and treatment have all continued to reduce, when compared with AR10. This reflects the substantial completion of these capital maintenance programmes at the end of the investment period.

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 Scottish Water for all of the lines in the two tables. Despite the improved processes for data capture and the allocation of projects to operational areas we support this assessment, which is consistent with our suggested confidence grades for Tables G1, G2, G3a, G3b, G4a and G4b.

The principal uncertainty relates to the accuracy of proportional allocation. The original equal allocation of expenditure between drivers on individual Q&S2 projects has not been revisited for all projects and in some cases proportional allocation has not been revisited at later Capex stages, despite changes to project content. Risks also remain to the progress of the few individual projects remaining to be completed.

Confidence in the allocation of costs to drivers is more robust for Q&S3a project, 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. However in our opinion accuracy for Q&S3a projects remains within band 3.

7. SECTION E: OPERATING COSTS AND EFFICIENCIES

7.1 Overview

7.1.1 General

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 allow costs to be allocated directly to assets. Scottish Water estimates that more than 85% of costs were being coded directly to assets by the end of the report year. Scottish Water has advised us that in future their target is to code almost 100% of attributable operational costs directly to assets.

- Scottish Water has allocated operating costs in the report year using an activity based management (ABM) system. This builds on the direct capture of cost to assets in the general ledger. The methodology adopted provides a rigorous and logical system of allocation based on recorded costs and activity measures and the knowledge and experience of managers. We have described the methodology and our audit of it in more detail below. The methodology used is the same as for AR09.

- Scottish Water has built a number of flags and checks into its ABM methodology which means that costs can only be allocated once and so avoids double counting.

- Scottish Water explains the treatment of costs associated with non core business in its commentary. Much of the cost associated with non core business relates to activities within Scottish Water Horizons with only a small element remaining in Scottish Water, including elements such as third party charges where a contractor damages an asset and shipping water which is sold directly to shipping companies.

- Scottish Water has explained the capitalisation policy in its commentary, our sample audits confirm that this is followed.

- We confirm that all operating costs associated with the construction of new works are capitalised until the works is complete and commissioned. No costs relating to SWS activities are included as operating costs.

Audit process

We held meetings and audited analysis software with the department who operate the ABM systems. We visited two operating areas to understand how they filled in the required data. During these visits our intention was to fully understand the level of manager allocation that went into the allocations.

As required by WICS we focussed our audit on the allocation of costs into assets and hence functional areas.

7.1.2 *Activity Based Management System*

Scottish Water uses an activity based management system (ABM) based on Metify software to better understand its business. One output of the activity based system is the allocation of costs which are used within the E Tables.

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 classification 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 treatment and water distribution. 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. Networks assets are grouped into a water distribution operating area or drainage operating area.

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. Travel time to a job is recorded as part of the job. Non operational time for holidays, sick, training etc are also captured. These costs are captured in Peoplesoft from the Company's Ellipse or Promise systems and taken directly into the ABM system. Staff cost recharges include an element of facilities or support costs, including vehicle costs, property costs and IT costs charged in from other departments as appropriate.

The plan to extend timesheets to a number of support areas for 2009/10 has not been fully implemented. However, most of the Asset Management Department is now on timesheets as are Financial Control. Legal and Estates are now looking at implementing timesheets and hope to start from April 2010. This means that over 1000 people in the asset management and support functions now use timesheets.

Where support departments complete timesheets they are captured in the company's financial accounting system, Peoplesoft, and show the type of work undertaken. The support departments' costs are then allocated to a receiving department and then activities based on an activity driver (e.g. volume of calls by department/activity or effort by department/activity.) For example, management accounting is split according to the effort needed to support the different teams and is then further split according to the activities undertaken by that team.

For non operational staff, or where no timesheets are available, these costs are allocated by managers based on time spent on various activities or effort in supporting a department. For some activities (e.g. regulation) which support the company as a whole, costs are allocated as an overhead according to functional expenditure.

Discussions with Scottish Water indicate that it is embarking on activity based budgeting (ABB) for 2010/11 and is hoping to move to an Oracle system for ABB and activity based costing (ABC) from next year. This is currently being trialled in financial control, operations and some areas of asset management. The view is that this will require teams to complete timesheets as part of their budget management process. In future Scottish Water will continue to produce annual returns on an ABM basis but this will use a different system and will be more closely aligned with the monthly management accounting processes.

Where possible, purchases of goods and services (e.g. SEPA charges, power costs and chemicals purchased) are allocated directly to the relevant asset department centrally. Where this is not possible costs are allocated by the operational staff responsible.

The ABM department accounts cover 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 eight operational areas in Scottish Water. 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.

Scottish Water developed a standard set of ABM activities which reflect the main activities carried out across its business. There are over 250 activity codes which are grouped together to reflect the WICS reporting requirements. Much of the allocation to activities now takes place centrally from detailed accounting and timesheet records. A set of allocation rules were developed to reallocate relevant support activities across departments based on activity drivers such as the utilisation of IT systems or the number of customer contacts relating to that department.

Schedules are produced for employment costs and for non-pay costs. 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. The input data is then 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 reviewed 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 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 operational areas with the staff who prepared the allocations. Each area is multifunctional covering water and wastewater and infrastructure and non-infrastructure activities.

7.1.3 Changes to ABM in the Report Year

In January 2010 Scottish Water restructured the customer service operations department. This moved from an eight region structure where the regional managers covered water and waste to five functional teams. This gives a greater focus on functional activity. There are now 5 general managers, Water ops, Wastewater ops, Control centre, Customer services and Support. Each of these is split into 4 areas which are broadly similar. They do not overlap entirely as customer service is driven more by workload than geography. The general areas are:

North: Previously covering Ness and the Argyle area of Forth
South: Previously Tweed and most of Nith
West: Previously Ayr, Clyde and part of the old Forth area
East: Previously Don and Tay.

Impact of restructuring on ABM

The pay schedules which are used for ABM have been produced in two parts: the first nine months as eight regions and the last 3 months as the new regions. For non-pay schedules most of the costs are directly allocated to the assets and so just move with the asset and are independent of the restructuring. Some costs are allocated to team and these have been dealt with as per the pay schedules.

In order for the costs to be allocated as accurately as possible an exercise has been undertaken to map new teams back to the old teams to complete the annual returns. Where a team moved on mass (e.g. leakage) this was a simple transfer. The majority of water and waste water teams can also be easily mapped back. However some of the networks teams and the customer teams have been significantly affected, with an original team being split over a number of new teams although the work undertaken in terms of activities is broadly similar.

The 2010 schedule provides the percentage of FTE spent on each activity. The mapping process then maps this back to the old team as a percentage to get the number of FTEs and hence payroll costs and the ability to allocate support functions. The assumption has been made that the people will still be undertaking the same type of work on the same assets as they were before the restructure. As the restructuring was at team level rather than operative level this is a reasonable assumption.

Scottish Water operates a no compulsory redundancy policy and those individuals without a role are transferred to a team in HR (Employee Support Programme) if they choose to stay with the company. These costs are allocated to the activity or department they have been supporting. The restructuring has reduced the number of managers and team leaders but has had no significant effect on the number of operators.

7.1.4 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. Individual works can be linked to treatment processes for completion of E tables as appropriate.

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, wastewater treatment works excluding septic tanks and most sludge treatment centres are identified as a separate asset department on the general ledger which captures 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.

The final schedules are checked back against the general ledger. 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 employment costs. This follows the allocation of support activity costs to primary activity/service based on support activity drivers where possible. 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 robust. The same approach was used for AR09.

7.1.5 Accounting Separation

For the audit for AR10 we have reviewed the ABM system and other Scottish Water systems in the light of accounting separation and the ability to accurately allocate costs accordingly. The comments below relate to operating costs. The allocation of capital costs for accounting separation is included in our narrative on Table G5.

Scottish Water's ABM system is fairly comprehensive, having around 250 separate activity codes, although it is noted that there is no activity against a number of these codes. Costs allocated to these activities can then be combined to produce the information in the format required for accounting separation. We believe that in general, costs could be allocated to the range of activities identified below, in an accurate manner.

Water Resources and Treatment

Within the current Water Resources and Treatment category there are 10 activity codes relating to water abstraction, 5 activity codes relating to raw water transmission, and 5 codes relating to water treatment. By taking the costs associated with the relevant activities, costs for water abstraction, raw water transmission and water treatment could be obtained. However it should be noted that some of these costs (e.g. power) would be manually allocated between business units. At a lower level Scottish Water has the ability to undertake some more detailed analysis by job type which are recorded in Ellipse and by assets as recorded in Peoplesoft.

Distribution

There is no separate code for distribution pumping. Where the distribution pumping station is separate from the WTW this is a separate asset and is automatically allocated to distribution. Where there is no separate asset an estimate is made as described later.

There are 30 activity codes associated with water distribution. There is no activity code associated with customer supply pipes but Scottish Water states that all supply pipe repairs which are chargeable to the customer are identified as rechargeable jobs and reported under non-regulated business.

Sewage Collection

Within the sewerage service there are 20 activity codes which would allocate costs to sewage collection. These are currently used to allocate costs to the sewerage element of table E2.

Wastewater Treatment

There are 7 activity codes which relate to wastewater treatment and are currently used to allocate costs to the sewage treatment element of table E2

Sludge Treatment and Disposal

There are 4 codes which relate to sludge treatment and disposal. These are:

- Intersite sludge tankering and movements – transportation of sludge from works to sludge treatment centre.
- Operation and routine maintenance of sludge treatment processes
- E&M maintenance of sludge treatment facilities
- Sludge disposal and associated costs

Use of these activity codes would allow costs for sludge treatment and disposal to be separated.

However, WWTWs and sludge treatment centres are often on the same site and as individual costs can only be allocated to one asset in ABM some costs have to be adjusted manually e.g. power. We discuss this further in our audit of operational areas.

Retail and Customer services

There are a large number of activities identified for this area. These include activities relating to billing, customer complaints etc. as well as the management of retail separation.

Other Activity Codes

The remainder of codes cover a wide range of secondary and support activities.

7.1.6 Reallocation between retail and wholesale

We have discussed with Scottish Water, the impact of potential further reallocation between retail and wholesale activities as described in Staff Paper 11. As part of the audit we discussed with Scottish Water how the operating costs for the elements below could be identified using ABM. We have included the costs allocated to these activities for the report year.

Supply pipe leakage

The costs are not currently separated to this level and will be included within the overall distribution costs under the relevant activity. We confirm from our audit that there is no activity definition available to record supply pipe leakage. Any rechargeable work on customer supply pipes is identified and included in non-regulated business and not included in the E tables.

Scottish Water confirms that it has discussed the issue of supply pipe repairs with WICS as there is already competition in this area as customers have the opportunity to use other suppliers for repairs.

Septic Tanks

Scottish Water owns and operates a number of septic tanks as part of its wastewater treatment processes. In addition it also empties domestic and business septic tanks on behalf of third parties. These are coded to different activities within the ABM system. Septic tank operations are undertaken by a dedicated team which are split into core and non-core activities.

A team of about 50 FTEs are responsible for intersite tankering, taking septic tank waste from Scottish Water's septic tanks to treatment centres as well as intersite sludge transfers. The annual cost of this activity is around £6.7m with a depreciation charge of around £1.3m

The remaining 20 FTEs are allocated to third party septic tank emptying. This gives a cost of £1.2m with £0.3m depreciation charge for domestic tanks and £0.63m with £0.16m depreciation charge for non-domestic.

For efficiency purposes tankers may collect from more than 1 category according to geographical location.

Scottish Water states that they have discussed this with WICS to confirm that emptying of third party tanks are already subject to commercial competition.

Metering

Until the recent re-structuring there were specific metering teams with 15 FTEs in total. Installations are undertaken as a mix of in house and external contractors. These are small in number as the majority of meters were installed as part of the full business metering policy. The majority of the work undertaken is now on accuracy tests and wholesale meter services.

In the recent reorganisation these teams were separated and are now included in larger teams in the Field Customer experience teams. However their time is still allocated to metering activity. Therefore it is easy to allocate these costs appropriately

- Meter installation including overheads at £1.6m and with £0.1m depreciation (all capital).

- Wholesale metering services with overheads at £0.5m with £0.03m depreciation charge. (opex).

Trade Effluent

There is one team of 25 FTEs responsible for all Trade Effluent (TE) support activities. The costs for this team are all allocated to one activity code and therefore easily assigned to trade effluent support. Other activity codes are no longer used as the work included is now undertaken by licence providers (LP).

There is significant concern within Scottish Water as to how the split would work if further elements were transferred to the Licence Provider. It would be feasible that a LP could agree consents in association with the asset operators. However, as Scottish Water retains the responsibility for ensuring the WWTWs are not affected they are concerned about relying on LPs to undertake monitoring and keep Scottish Water informed in a timely manner.

There would potentially be a significant impact on the laboratory. At present sample and analysis costs are combined for WWTW and TE samples. In order to split these an element would need to be allocated to TE probably on number of samples although it could also be split on number of visits or number of tests. If sampling were transferred to LPs and the LPs decided not to use Scottish Water's laboratories then there would be an impact on overheads as Scottish Water are tied into a very expensive leasing agreement which is the subject of a special factor claim.

The costs associated with trade effluent support are around £1.4m, excluding sampling and analysis

Connections

There is a central connections team which has remained unchanged as part of the restructuring, although there may be some movement over the next 12 months. There are currently about 75FTE working in this area.

The overall costs, for Scottish Water's staff and contractors, are £4.1m with £0.5m depreciation charge. Scottish Water's staff costs are around £2m. All costs are capitalised

7.1.7 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. Where the allocations cannot be made centrally local managers and financial staff work closely together to allocate the remainder of the costs and these allocations generally appear reasonable. 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 the 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 costs are reallocated to activities within that department, either based on the same driver, if that driver is activity specific (e.g. water bursts contacts), or based on the activities undertaken by that department. This might result in costs 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.

In our audit we discussed the differences between the raw ABM data and the General Ledger (GL) which related to the ABM slightly over-allocating to Capital. This is due to the fact that some support costs are allocated to capital in the ABM standard calculations but the Financial Reporting Standards requires them to remain as opex. To maintain consistency with the accounts, the ABM output is adjusted to match the financial accounts. 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.

The total adjustment made is £13m which includes £8m to capital, £3.4m to PFI, although this element remains within the E tables, £1.7m to Scottish Water Solutions, £400k to Business Stream and £40k to non regulatory activities.

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.

There are a number of minor adjustments that have been made for the current report year. If a major adjustment is found the process would be re-run.

Ross Priory, Loch Lomond source - The source goes to two water treatment works in different areas: Balmore WTW in Clyde and Blairlinnans WTW in Forth. The ABM system only allows a source to be allocated to one works and so it was allocated to the Clyde region on the basis that the largest volume went to this works. An adjustment of £170k was identified using the water treatment model and manually adjusted to the Forth region to ensure the costs are correctly reported by region. Next year both works will be in the same region following the reorganisation of regions detailed above.

Mobile phones - Mobile phones used to be charged to IT and allocated as a support activity. They are now charged to the regions. Therefore £850k was transferred from direct costs to G&S. This can be corrected for next year.

CMA charges had not been picked up as they hadn't gone through a separate activity. These costs had been spread across household and business so were removed and allocated to business only.

There was a minor issue with the units allocated to a volumetric driver but this only affected the retail channel.

Kirkcaldy WWTW - SEPA charges were incorrectly allocated in the bill from SEPA as a drainage operating area. This is a large treatment works and as such affects table E9 and so an adjustment of £40k has been made.

The output from ABM is then used in a complex Excel spreadsheet for allocation to the E tables. A number of checks are built into this spreadsheet. This data is reconciled back to the General Ledger. There is a good audit trail which can track individual costs throughout the process.

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.

7.1.8 Specific Audit Findings

Operational Departments

The operational areas audited for the report year were the Clyde and Tay Regions. Both are multifunctional, consisting of a number of teams each with a specific team leader. For the majority of staff, time is captured either directly through the work planning system where each job is allocated to an asset or by timesheets which are then input into the Ellipse system. Where this is not the case the team leader or local manager allocates the time based on the work undertaken by the individual. From our audits and discussions with local managers, team leaders and management accountants we conclude that the allocation is based on the type of work undertaken and is correctly allocated. There a specific activity code set up for each ABM department entitled "own department team management" where the team leader and managers time are coded to as well as time spent in team meetings etc. These are then reallocated in proportion to other activities.

Employment Costs

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 allocate costs to assets.

Scottish Water has continued to implement the electronic time-sheeting systems for its operational staff. Direct allocation of WTW and WWTW operational staff time is high, typically running at 85-95%. For E&M teams the direct allocation is 70-75% and for Network teams this is a little lower ranging from 50 to 70%. 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 are produced showing recorded costs or staff time. Operational managers are asked to allocate the remaining costs and make any other amendments necessary based on their experience.

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. The main reasons for non capture of operational time were related to non productive time such as holidays and team meetings.

Scottish Water is currently introducing an advanced work scheduling system for operational staff which will require them to complete the capture of time and materials against a work order before they move onto the next job. This is currently being rolled out in Networks. We understand that the accurate completion of timesheets, including time and materials used, in the Ellipse and Promise systems also forms one of the objectives in the individual performance and review assessments. This is regularly monitored by the team leader and discussed with the individual concerned to drive completion towards 100%. We viewed the management reports for 1 Network area which detail the amount of time captured by individual. From the report it could be seen there is still room for improvement but there is a strong focus in this area.

Non Pay Costs

Costs other than manpower are generally allocated directly to the assets but where this is not possible local managers allocate the costs based on local knowledge of the assets. This is described in more detail below.

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 cost to specific assets in the subsequent E Tables.

The draft schedules prepared centrally for operational departments have the majority of non pay costs allocated to assets and to specific activities. For the areas audited these were between 85-100% complete and the local management accountants and managers work together in allocating the remaining costs. 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 (e.g. chemicals).

During our audits we were able to reconcile asset accounts to the general ledger. Inspection of the item descriptions indicated that the initial cost allocation was reasonable and that the accounts had been actively checked and reviewed. The two key reasons for costs not being allocated centrally were either that they had been allocated to an asset but there was no activity code, or they had been allocated to a team code. For those in the former category allocations were made on the basis of local knowledge and experience. For those allocated to a team code some costs were reallocated to the activities such as chemicals used for secondary disinfection but some were allocated on the basis of FTE as they were used over a number of activities. Examples of this include protective equipment and hire of vehicles and plant.

We reviewed the non pay schedules. The allocations are reviewed by the management accountant with reference to the local manager where required. We tracked a number of entries in the non pay schedules back to the general ledger, focusing specifically on where costs did not look as though they were correct. In general we confirm that the allocations appear robust.

We noted one cost of £126,000 sitting within Clyde Region for wholesale metering services. We challenged Scottish Water to explain this as similar entries were not seen in other regions. Scottish Water confirmed that it relates to a block code for the whole company.

We queried a cost for sludge and waste disposal allocated to operation and treatment of WTWs. Scottish Water was able to demonstrate that these costs relate to the disposal of screenings at the inlet to the WTW and were appropriately allocated.

We found one error in Clyde where £4,500 of chemical costs had been allocated to the operation of raw water pumping stations. When tracked back to the GL these were for secondary chlorination chemicals and should have been allocated to treated water pumping stations.

We found one area in Tay region where £16,000 of power costs had been incorrectly allocated to mains repair activity. We tracked it through the ledger and it related to power cost at a pumping station but had been allocated to the wrong code.

These errors in cost allocation were very small and not material.

We found a small number of differences in the schedules for different regions. An example was mobile phone costs where for one region these had been allocated by the local management accountant and allocated across the main areas of activity. For another region they had been allocated centrally in line with employment costs. We do not believe this would significantly affect the overall allocations but Scottish Water will review this to standardise the approach.

The ABM schedules for the report year were run after period 9, before restructuring and again after period 11 (draft schedules are reviewed by managers and their management accountants at period 11 to allow time for a detailed review). These are then updated for period 12.

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.

Allocation of costs where asset cost centres impact on more than one function

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.

<u>Allocation of distribution pumping costs:</u>

The methodology used for calculating distribution pumping is kilowatt rating of the pumps and hours run. This then calculates an expected kilowatt hours for those pumps. The calculation below determined the percentage split between WTW and TWP at Perth WTW using 9 months worth of data to Pd09.

At Perth Water Treatment Works there are two Treated Water Pumping Stations:

Burgmuir TWPS has 5 pumps each with a kilowatt rating of 160Kw. One pump is run for 24hrs per day and one other for 12 hours a day. 2,102,400 KWhr

Muirhall TWPs has two pumps each with a 110 Kw rating and one pump is run for about 80% of the time 770,880 KWhr
Pumps are cycled using the SCADA system.

Predicted annual consumption	2,873,280 KW
9 month equivalent would be	2,154,960 KW
Actual consumption April-December 2009 (Optima report)	2,449,221 KW
Percentage attributable to distribution pumping	88%

This methodology appears reasonable and was used throughout the two areas audited. The AR09 audits in two other areas showed the same approach.

For borehole works all pumping is classed as water resources and treatment as the same pumps are used to abstract and supply the water. We reviewed one site Turriff in the Don region where the head is broken for treatment and further pumping is required to pump into distribution. This site was treated as a WTW with the second stage pumping being allocated to distribution.

Labour costs for E&M staff are attributed to the TWPs through the work order which allocates the cost to a particular asset or in this case a particular pump. Any materials recorded on the work order follow the time, travel etc to the asset. Operator time is not allocated to the TWP as the only work undertaken is a visual inspection as they walk past and a small amount of time on the SCADA changing pumps. This would have no material effect on costs.

Allocation of costs, between sewage treatment and sludge treatment:

Team leaders or managers have reviewed the split and there is an audit trail of who undertook the review, when and some brief comments as to how this was done. However from the audit it was felt that there is little guidance given to managers as to the methodology to use and there are no clear audit trails as to exactly what was done. We were not able to obtain copies of calculations for audit.

Within Tay region there are 5 works where adjustments have been made to split sewage and sludge costs. This exercise is only done for medium and large WWTWS. Three of the works have some costs directly allocated to the sludge plant, Dunfermline, St Andrews and Perth. Two works do not have costs directly allocated although they have specific asset codes.

Labour costs have been directly allocated for 2 works: Dunfermline and St Andrews. For the other works Team Leaders have estimated the split of time. As the work should be via works orders for operators and E&M staff there should be direct allocation via the sludge centre codes.

Sludge and waste disposal: skips used for screenings and grit removal are correctly allocated to wastewater treatment. All other disposal is allocated to sludge although this was a mix of direct cost capture and manual allocation.

SEPA costs are all allocated to wastewater treatment for three sites, Kirkcaldy, St Andrews and Montrose. For the other two sites: Dunfermline and Perth, both have waste management licences and so these costs are allocated to the sludge centre by manual allocation. As the effluent from the sludge centres goes back through the works this is counted as a wastewater treatment cost and so no costs are allocated to sludge.

Chemicals: for the works audited chemicals were used either for wastewater treatment or sludge treatment and so the split of costs was straightforward. There was only one works, Montrose where a manual allocation was required as all the chemical costs had been coded to the WWTW.

Contract repair and maintenance was more difficult to allocate. An element of E&M work had been directly allocated to sludge centres but all other work was allocated to wastewater treatment. Whilst we recognise that the bulk of the costs would be associated with this area there may be an element which should be allocated to the sludge centres.

Power costs are probably the most significant areas of manual allocation. Two sites: Dunfermline and Perth have the majority of the power allocated to the sludge centre whilst all other works all the cost is allocated to the WWTW. We challenged Scottish Water to explain this difference and understand that the Team Leader did not properly adjust the percentages. Scottish Water states that a new process will be put in place to ensure consistency and higher accuracy, similar to the pump run times used for water.

Rates charges are all allocated to wastewater treatment where a portion of the assets and hence associated rates should be allocated to the sludge centres.

For the Clyde region there were two major WWTWs: Dalmarnock and Shieldhall. At Dalmarnock costs had been allocated to the sludge treatment centre for labour, 25%, Contract E&M and materials, 10%, and power 45%. For Shieldhall costs had been allocated to the sludge treatment centre for labour, 25%, and power 7%.

The variation between works and lack of auditable calculations mean we cannot confirm if these costs are correctly allocated, although we recognise that the judgements are made by experienced managers who know their works and the activities undertaken well.

We recommend that guidance is given to managers and that there is a documented audit trail showing the methodology used to calculate the split of costs between WWTW and Sludge Treatment for each works.

7.1.9 Infrastructure depreciation charge

This year Scottish Water has set an infrastructure depreciation charge of £106.2 million. This is an increase from last year's figure of £104.2 million.

Scottish Water's infrastructure depreciation charge is not set the same way as in England and Wales but has generally been 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 last year's IDC would be £88M, rising with inflation resulting in a figure of £94M for the reporting year.

In tables G1 and G2 Scottish Water is forecasting its future IME. This indicates a spend of £97.51 million this year and -£12.26M (adjustment) next year, at variance with the proposed £106.2 million of IDC. Overall the actual spend IME for the 4 years of Q&S3a including the adjustment for 2010/11 is forecast to be £445.0M compared to WICS IDC of £364.0M.

Scottish Water is also proposing to increase its spending on its infrastructure in the SR10 period partly as a result of deterioration modelling of its assets and partly due to other considerations. The average spend is estimated at £113.0M post efficiency (Tables 5.1 and 5.3 of the Business Plan).

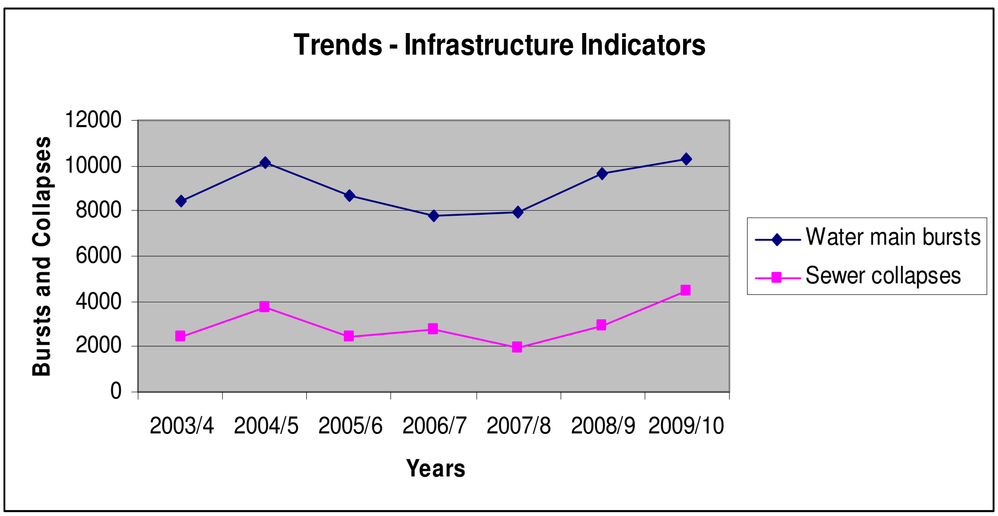
Based on these facts Scottish Water's Board has agreed a figure of £106.2M for the reporting year giving a 4 year total of £388.4M compared to actual spend of £445.0. .

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	2008/9	2009/10
Water main bursts	**8466**	**10102**	**8713**	**7822**	**7975**	**9631**	**10279**
Sewer collapses	**2399**	**3740**	**2468**	**2754**	**1978**	**2884**	**4452**

This is shown below in graphical form:



Water mains bursts are now higher than the average and show a rising trend, which has now persisted over 2 years. However, both 2008/9 and 2009/10 were cold compared to the average and while this year's results continues the rising trend of last year it is likely that there will be a fall next year unless the winter is again cold. The trend of rising sewer collapses again shows a rising trend that has persisted over 2 years. This is of more concern and we recommend that Scottish Water analyses its data closely to see if it can explain the trend and hence take remedial action.

7.1.10 Reconciliation to Annual Accounts

The reconciliation between the total sums reported in Tables E1 and E2 and Scottish Water's accounts is as follows:

From the Annual Return

Total operating cost (water service) – Line E1.31	326.5	£m
Total operating cost (wastewater service) Line E2.30	274.0	£m
Total operating cost (PFI) Line 3a.24 & E3a.26	138.5	£m
Total operating cost	739.0	£m

From Scottish Water's Accounts 2009/10

Cost of sales (ex Income and expenditure account)	674.3	£m
Administrative expenses (ex Income and expenditure account)	104.5	£m
Exceptional items (ex Income and expenditure account)	0.0	£m
Deduct running costs of Business Stream	(20.7)	£m
Total operating cost	758.1	£m

The difference between the Scottish water accounts and the Annual Return relate to:

- £2.1m for support to SWBS
- £21.2m for work undertaken by SWH

Based on the reconciliation above, the total operating costs reported in Table E1 and E2 excludes:

- PPP costs, including fees paid and Scottish Water's internal costs, which are reported in Table 3a.
- Net interest payable.
- Taxation
- Gain on sale of assets.
- Running costs of incurred by Scottish Water Business Stream

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. Scottish Water has provided a detailed commentary and further detail of the explanation of variance between the water and sewerage services is given in the Scottish Water commentary for tables E1 and E2.

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 the overview to this section.
- Overall operating expenditure has increased from £288.9m in 2008/09 to £301.3m in 2009/10, an increase of £12.4m. This includes 3 atypical items, £3.1m for severe weather conditions, an increase of £7m for additional costs relating to restructuring costs and £1.7m relating to bad debt.
- The costs associated with severe weather include additional costs for overtime, increased activity on mains repairs, additional H&C for snow clearance and hire of vehicles. The severe weather lasted significantly longer in Scotland than for England and Wales.
- Scottish Water has commented on the movement in total cost by line. Many of the overall changes reflect a series of increases and decreases which are detailed in Scottish Water's commentary. We believe these explanations are reasonable

Methodology

We have described the methodology used for allocating costs to E tables in the overview to this section.

Comments by Line

Line 1 - Employment costs:

Direct employment costs are identified from the allocation of employment costs to activities. Employment costs have increased in the report year by £3.6m to £66m. This reflects inflationary and pay performance increases of £2.3m along with additional pension contributions of £0.5m, new operating costs of £0.2m and additional overtime due to bad weather of £0.8m, partly offset by efficiency savings. We reviewed the additional costs for bad weather. These costs were coded to an incident code so could be correctly allocated.

In its commentary, Scottish Water reports an average headcount employed during the year of 3534, an decrease from 3583 reported in 2008/09. The total number of employees reported in Table E11 is 2312, down from 2340 in 2008/09. 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.

Line 2 - 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. We have reported on these allocations in our overview for section E.

Power costs increased by £2.8m during the report year to £35.3m. This increase is reported as £0.7m for water and £2.1m for wastewater services.

Power costs have risen by £5.7m (17%) which has been partly offset by a reduction in consumption due to leakage reduction and a number of initiatives in place to manage power usage both at operational and non-operational sites as well as a slight increase in renewable energy credit totalling £4.3m. Increased power costs have been seen for new opex (£1.0m) and severe weather (£0.4m).

Line 3 - 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 decrease for the report year of £7.3m to £27.3m.

The water service reduced by £6.2m, which included a reduction of £6.4m due to a reduced activity on leakage which followed an increase of £13m in the previous year. This was offset by increased opex from capital investment of £0.2m.

The H&C costs for the wastewater service reduced by £1.1m. This was mainly as a result of more efficient use of sewerage contractors. Scottish Water has appointed a contract manager to focus on reducing costs in this area.

Line 4 - Materials and consumables

Material and consumables are generally allocated directly to operational assets or a sub-area of the operational areas in the accounts.

For the report year there was a increase in costs of £1.3m to £14.9m. For the water service there was an increase of £0.9m at WTWs due to chemical price increases and new opex which was offset by £0.4m as a result of leakage reduction. The wastewater service saw an increase of £0.8m due to increased chemical prices and increased materials associated with maintenance at WWTWs.

Line 5 - 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 £0.1m increase in SEPA costs for the report year to £10.4m, mainly due to inflation.

Line 6 - Bulk supply costs:

Scottish Water does not receive bulk supplies.

Line 7 - Other direct costs:

The increase in other direct costs of £1.3m is mainly due to an increase in insurance claim costs.

Line 8 - Total direct costs:

This is a calculated line summing the direct costs.

Line 9 - 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 a significant increase in G&S costs for the report year of £6.3m to £41.7m. This is made up of increased costs in a number of areas including inflation performance related pay increases (£0.5m) additional cost of vehicles due to the prolonged bad weather (£0.5m) and increased restructuring costs of £5.8m, which is noted as an atypical cost.

Line 10 - Functional expenditure

This is a calculated line summing the direct costs and associated general and support expenditure.

Line 11 - Customer services .

The allocation of customer service and billing activities between the water and sewerage service is driven by various activity drivers such as the volume and the type of bills issued and other billing activities.

Customer service costs have increased by £0.7m in the report year to £18m. This is mainly due to increased cost of the council billing and collection service. There has been a sight shift of £0.1m from water to sewerage services for the report year reflecting a change in the volume driver.

Line 12 - 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.

Costs for the report year have increased by £0.1m to £11.7m. There has been an increase in the number of samples as well as inflationary increases which account for around £0.3m. This has been partially offset by efficiencies due to the closure of the Dundee laboratory during the report year. £10.5m is allocated to water on the basis that 89% of the samples are water samples, £1.5m is allocated to wastewater services.

Line 13 - Other business activities

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

The costs for the report year have decreased by £1.4m due to a decrease in WICS fees of £0.7m and Scottish Water regulatory activity of £0.9m offset by increases in Central Marketing Authority costs of £0.2m.

Line 14 - Total business activities

Calculated from the three lines above.

Line 15 - 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.

For the report year rates have increased by £1.0mfor water services due to an increase of 4.9% for the water undertaking and £0.6m for sewerage services due to the increase in UBR.

Line 16 - Doubtful debts

Doubtful debts are allocated between the water and sewerage service based on household revenue..

For the report year household bad debt charge has increased by £4.7m. £2.3m is allocated to water service and £2.4m to sewerage. This is taken from the regulatory accounts and has not been audited further for this report.

Line 17 - Exceptional items

No exceptional items are reported this year

Line 18 - Total opex less third party services

Total opex less third party services is calculated from the data above.

Line 19 - Third party services – opex

Third party costs included in the E tables relate to core third party costs only. There is a decrease of £0.7m for water and £0.7m for wastewater. This reflects a decrease in mains diversion activities and a reduced bad debt provision.

Lines 21 & 22 - Planned and reactive maintenance (included in opex)

For the sewerage service there was an increase of £0.7m to £13m for infrastructure mainly reflecting increased insurance claims. Expenditure on non infrastructure assets, increased by £0.3m to £7.6m, mainly due to increased maintenance activity on WWTWs.

For the water service there was a significant decrease of £4.5m for infrastructure, mainly reflecting the decrease in leakage activity. For MNI there was an increase of £1m reflecting increased activity on WTW assets.

Line 23 - Infrastructure Depreciation Charge

The infrastructure maintenance charge is allocated between water and wastewater on the basis of assets in the fixed asset register. The overall IMC for the report year is £106m (£70m allocated to water and £36m allocated to wastewater)

Line 24 - Non-infrastructure depreciation charge

Depreciation is directly charged to assets, and therefore services, based on the fixed asset register. Depreciation on support activity relating to assets is allocated based on the relevant ABM support activity drivers such as IT application user numbers.

The company has noted the increase of £10.9m to £79m for non-infrastructure depreciation in the water service due to new assets being commissioned.

The non infrastructure depreciation charge for the sewerage service has increased by £21m to £106m reflecting the impact of newly commissioned assets.

Lines 25 to 29 - Other capital maintenance costs

Costs relating to amortisation of deferred credits were broadly similar to 2008/9. No costs were allocated to amortisation of intangible assets. Business activities depreciation charge was broadly similar to 2008/09. Third party services depreciation increased by £0.5m of which £0.2m related to the water service and £0.3m to the sewerage service.

Comments by Confidence Grade

The company reports confidence grades of A2 for most cost allocations and A3 for reported planned and reactive maintenance costs. This is the same as for 2008/09 and we believe that this is reasonable.

7.3 Tables E3 & E3a – PPP Project Analysis

As agreed with WICS these tables have not been audited this year.

7.4 Table E4: Water Explanatory Factors – Resources and Treatment

Commentary by REPORTER

Introduction

Key points

- This table reports on operational assets only and covers all assets operational at any time in the report year. The methodology used is as in previous years. Changes to the asset inventory can be tracked.
- From AR08 a change was made in the counting of numbers of direct and indirect sources. Ellipse is not capable of distinguishing between direct and indirect sources. Consequently a separate spreadsheet is maintained distinguishing between them. WIC guidance is followed when counting direct and indirect sources.
- 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 made substantial improvements to the data available for the average pumping head calculation in AR09 and has updated the figures for 2010, leading to a small increase in average pumping head.

Methodology

The methodology is outlined under "Comments by Line" below. Our comments on asset data and inventory in the section on Table H2 of this report are relevant to Table E4. These are not repeated here but reference should be made to them.

The methodology used in cost allocation has been detailed in the overview report on Section E.

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. Because Ellipse cannot distinguish indirect from direct sources a separate spreadsheet is kept which makes this distinction. This consists of data from 2007, updated manually for 2010. While there are unlikely to be significant changes in individual years, this method is likely to become more inaccurate over time and we recommend that is should be revisited for AR11.

The total average daily output (line E4.5) is the same as the distribution input reported in Table A2 (line 2.11). 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 AR10 are counted as a single source.

Lines 8 to 12: Source outputs are allocated to areas using the operational area designation held in Ellipse. Scottish Water reports against 8 areas for the report year. The total volume of distribution input produced is consistent with the distribution input reported in Table A2.

Line 13: The peak demand to average ratio is the same in AR10 as in AR09. There are 24 more pump sets installed in Scottish Water, all of small size and their combined effect on the calculation from the existing data set is well below the threshold for a change to the return figure. A major recalculation has been avoided and the ratio is unchanged.

Line 14: The table below gives details of the average pumping head submitted by Scottish Water for the last 4 years.

Description	AR10	AR09	AR08	AR07
Resources and treatment (E4.14)	26.39	25.3	27.2	21
Water distribution (E6.25)	29.84	29.72	28.84	34.13
Sewerage (E7.17)	29.8	27.3	19.3	20.7

For AR10, Scottish Water has not changed its method of calculating average pumping head. Dependent on the information available Scottish Water uses a number of methods:

Scottish Water has flow meters on the source of raw water or at the entrance to treatment works for at least some of its sites, but these are not all connected to the corporate telemetry system. It records distribution input as the flows leave the treatment works. To determine the flow required for the average head calculation for water resources the Company has assumed a percentage process flow loss through the works. However if the source flow volume is known the Company has used it.

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. Scottish Water 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. Scottish Water 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.

For AR10 water resources and treatment average pumping head Scottish Water reports a slightly higher figure than last year. Scottish Water's commentary notes that the changes are due to better information (reducing the need for extrapolation) and the addition of 12 new pumping stations. However, these are all small and have a very small impact on the calculation of the average pumping head..

In our audit we reviewed the work required to assemble the data for AR10 and the amount of data gap fill needed to complete the calculation of the asset data. We confirmed that the new pumping stations are all small and that, for a sample of three that we reviewed, data was transferred correctly to the Ellipse database.

In inspecting the Ellipse records we noted that data for assets can be entered at several levels that correspond to the complexity of the site. For those we inspected, we noticed that information for the pumps was not always complete and that the date of installation or construction of the pumps was not available.

We reviewed the data for 3 other pumping stations that had changed markedly since 2009. We saw that in some cases actual readings had replaced infill data. In other cases actual data varied markedly from previous assumptions. We challenged Scottish Water to supply data to support the changes. This it was able to do and so we accept that the revised average pumping head is based on the best currently available information. Nevertheless our audit does indicate the very large discrepancies and swings in the data that continue to occur and the need for Scottish Water to improve its data in Ellipse.

Scottish Water is aware of data deficiencies and the Inventory team of GIV has a current project to bid for SR10 funding to cover asset data improvement for regulatory purposes. We are surprised that the data is not already available for operational and managerial purposes.

Lines 15 to 19: The number of sources has reduced by 40 to 318 for the report year. The number of water treatment works closures for the report year was 19. Scottish Water has explained the changes in its commentary. The total DI has reduced by 99.3Ml/d to 2044.4Ml/d.

We have reviewed the calculations used by Scottish Water to allocate resource and treatment works costs to complete table E4. The spreadsheet enables costs to be collated by works size, process type or region.

Costs have been allocated to assets using the ABM process described in the Section E Overview. Scottish Water states that around 83% of costs are directly allocated to specific asset codes for the report year. The reported costs reconcile to the resource and treatment costs reported in Table E1.

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. If a source feeds more than 1 works, costs are allocated on the basis of DI from the works. Where a source is located in one region but the WTW is located in a different region then source costs are allocated to the region in which the WTW resides. These are very few in number. We confirm that for the source audited at Loch Lomond this methodology was used.

The allocation of costs from ABM to individual assets takes account of the allocation of power costs between resource and treatment and distribution. This is a manual allocation based on volumes, kW rating and hours run of the relevant pumps. This is described further in our overview to the E section.

Water resource and treatment costs by region shows a mix of small increases and decreases as compared to the previous year, the reasons for these are covered in Scottish Water's commentary. Overall movements in costs for WTWs are covered in table E1.

Lines 20 to 27: The reporting of costs associated with water treatment works by process type covers the number of works which were in operation during the year. There were a number of changes to the works banding mainly as a result of process changes which had been introduced during the year or through the abandonment of sources.

There were movements in each process category and two examples are shown below.

Process type SD showed a reduction in numbers by 9 works, 6 were no longer operational, one moved to W1, two moved to W3, one moved to W4 and one transferred in from W4.

Process type W3 showed the largest change, an increase of 13, two were no longer operational, one had moved to W4, 2 had moved from SD, 2 had moved from W1, 7 had moved from W2, 4 had moved from W4 and there was one new works.

The costs follow the movement of works between bands. We were able to follow these cost movements on the spreadsheet provided by Scottish Water.

Scottish Water have re-stated the movement in costs for 2008/9 on a like for like basis to show a more reflective change in costs compared to the previous year. The subsequent changes in costs reflect the movements described in table E1.

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.

Scottish Water included in its commentary details of the movement in costs by works size, which again shows changes due to changes in bands. These relate to changes in output from a number of works either from capital investment or due to reductions in output experienced at the works during the report year. The movements of works between band sizes are detailed in the commentary which also shows the band sizes for the 19 works that have been closed. A number of the larger movements are explained in the commentary with other costs following the overall cost movements described in table E1.

Comments by Confidence Grade

We consider the confidence grades reported by Scottish Water to be reasonable, with the following comments:

Lines 1 to 7: For AR09 Scottish Water claimed an improved confidence grade of B3 which is maintained for AR10. This is consistent with the reported confidence grade of B3 for distribution input in Table A2 and is justified by improvements in data collection and handling since AR09.

Line 13 As the same figure has been used in the AR10 return as in AR09 and the confidence grade of C4 has been used again. This is reasonable.

Line 14 The marked improvements during AR08 and AR09 to the quality of Scottish Water's data for head and flow at each pumping station remain and have been updated for AR10. Significant swings in the data and data infilling remain. We believe that a confidence grade of B3 is reasonable, consistent with that claimed for distribution input.

Lines15-30 The confidence grade on A2 is the same as that used for table E1. The costs come from the general ledger and are allocated to specific assets and activities using Peoplesoft and ABM. This is the same as for the previous year and we believe it is reasonable.

7.5 Table E6: Water Explanatory Factors – Distribution

Commentary by REPORTER

Key Points

- We have audited sources of population, physical, service and cost data, the calculation of average pumping head and the methodology for compiling the table. We have checked the consistency of data with that reported in other tables in the Annual Return and the base data.

- The line definition for line E6.1 requires consistency with Table A2, line 1 - the winter population (population supplied during the reporting year in Scottish Water's area of supply). The E6.1 definition "Average Annual Resident Connected Population" (average annual resident population connected to the water distribution system in each distribution sub area) is consistent in so far as the two definitions imply connected or supplied populations. However the reported numbers for both are the total Scotland population and not the serviced population as reported in line A2.5 and implied for line E6.1. The reasons for reporting the total winter population appear to be historic. We recommend that WICS clarifies exactly which number is to be reported if consistency is required.

- The information reported is generally consistent with other sections of the return including populations, properties and water supply in the A Tables, burst and low-pressure information in B Tables and the asset inventory reported in the H Tables.

- Operating costs have been allocated through the ABM process described in Section E overview. Total operating costs for water distribution align with those in table E1.

- The lengths of main in various categories are taken from the corporate GIS. Lengths reported include infilling for missing data and the default diameter where this is unknown is 150mm. The total length of main reported is consistent with the length of potable water main in other tables. The length of unlined iron main continues to include a downward adjustment for mains which have been lined but where GIS has not yet been updated.

- The total leakage quoted at line E6.20 (783.473 Ml/d) is consistent with Table A2, line 30 – Top Down Total leakage – total losses. The quoted volumes for sample areas were audited and are consistent with how the water balance was compiled.

- Mains bursts are taken from the Scottish Water operational database and whilst there is a degree of data cleansing the process is accurate within the confidence grade claimed.

- The Company made substantial improvements to the data available for the average pumping head calculation in AR09 and has updated the figures for 2010, leading to an insignificant increase in average pumping head.

Audit Process

During the audit we reviewed:

- Sources of data on areas, zones, populations, properties and volumes
- Distribution operating costs
- Data and systems covering asset inventory and capacities
- Mains bursts, leakage and properties reported for low pressure
- The calculation of average pumping head
- The methodology for allocating costs and compiling the table
- The consistency of data with that reported in other relevant tables in the Annual Return and other sources where relevant

We also audited each line of the table to confirm the audit trail back to the base data. The audit was carried out by interviewing members of Scottish Water staff responsible for the compilation of the tables and with direct, unrestricted access to data held on Scottish Water information systems.

Methodology

The methodology used varies for the different lines of the table and is described under Comments by Line where relevant below. The table covers all assets which were operational at any time in the year.

Conclusions

From our audit we concluded that Scottish Water has thorough processes in place for collecting base data for Table E6. Data checks showed the base data to be compatible with entries in the tables. Line entries in the table were generally consistent with other relevant lines in the Annual Return.

Scottish Water has generally provided explanations for changes in table data and disclosed material assumptions. These are detailed below in our line commentaries where relevant. We are not aware of any sensitivity analysis carried out on table data. Except where noted in detailed line commentaries, populations and connected properties, water volumes, lengths of mains, numbers of bursts, leakage levels and asset information are consistent with other relevant lines in the Annual Return. Costs reported in Table E6 align with those reported in Table E1.

Comments by Line

Line 0: For AR09, Scottish Water's 8 regional operational areas are unchanged. They are based on the 32 regional council boundaries. Three unitary authorities cover more than one regional operational area, but Scottish Water's boundaries then generally follow lower local authority boundaries so that populations follow published data.

Line 1: The average resident connected population is the winter population distributed across the regional operational areas. Connected population was derived from figures 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.

This line total (5,035,060 population) is consistent with the number derived by Scottish Water for the total annual average resident water population of *[Domestic lines A2.3 + A2.4 + population not in domestic properties (90,976)]*. The number is consistent with lines A2.1 and A2.6.

Line 2: The reported total number of connected domestic properties is derived from local authority data in the same way as in line 1 above. Non-domestic properties are added from address point postcode analysis. The reported total number of connected properties equals line A1.10, as defined. The methodology for calculating line A1.10 is described in our commentary on Table A.

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 are 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 our commentary on Table A.

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 methodology, the polygons used to define the operational boundaries and the total area of 79761 km2 are unchanged from AR09, when it was considered sufficiently accurate to warrant a confidence grade of A1.

Line 6: The number of supply zones is reported as the number of 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

In the audit we reviewed the representation of zones in Scottish Water's GIS system as land objects, which allows direct generation of the figure for the Annual Return. Each zone is allocated to a region by operational control.

At the end of AR10 there were 323 regulatory water supply zones. The number of zones in AR09 was 329; the reduction has resulted from rationalisation of water quality regulation zones. There were no transfers of zones between operational regions in the year.

Lines 7 – 11: General

The allocation of costs is described on our overview to our report on the E tables. For the report year there was a restructuring in Scottish Water from January 2010. Costs for the first 9 months were allocated to the 8 regions. Costs for the latter 3 months were mapped back to the old structure to give a full year allocation to the 8 regions before re-structuring.

Power

The costs included here reflect the power costs allocated to each region. 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. This is on the basis of the kilowatt rating of the pumps and the hours run. The total operating costs for water distribution reflect these reallocated costs. These have been reviewed for the report year and calculated on a consistent basis. We provide an example calculation in our report on table E1. Our audit of Tay and Clyde regions confirm the power costs shown in table E6.

SEPA Charges

No SEPA charges are allocated to water distribution.

Total Direct costs

The allocation by geographical area combines the costs associated with the assets and teams within that area. The costs are included at this level within Peoplesoft and so allocation by the region is straightforward. Our sample audit of two operational areas confirmed this to be the case. For Networks teams the proportion of employment costs directly captured is less than for treatment works and relies more on the allocation by managers. However this is unlikely to impact on the allocation to areas included here as the total costs for the team are included.

G&S Costs

G&S costs are allocated where possible to an activity. Where this is not possible Costs are allocated on the basis of employment costs.

Functional Expenditure

This is calculated from the above and aligns with the costs in table E1.

The movement in costs for distribution are described in our report on table E1 and include increases in employment costs, power, insurance, extreme weather and VR and restructuring costs, partly offset by a decrease in leakage activity.

Lines 12 – 18:	The lengths of main in various categories are taken from the corporate GIS. Lengths reported include infilling for missing data and the default diameter where this is unknown is 150mm. Infilling is discussed in greater detail in the commentary on Table H3 for AR09. This is not included in our commentary on the H tables for AR10 as our review of H Tables this year has been restricted to a high-level audit. The total length of main reported at line 16 is consistent with the length of potable water main in D5.8 and H3.4. The assessment of this length is discussed in greater detail in our commentary on Table D5.
	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 and 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.
	Water main data are held in GIS. During the audit the MEAV database for infrastructure assets was examined. This is the database which Scottish Water compiles and maintains for the reporting of the asset inventory and is the basic source of data for Table E6. It is downloaded from GIS, but in addition to GIS data also includes infill for missing data. Data listed included diameter, material, type (public or other), Scottish Water area, surface type and commissioning date. The total length of potable main at line E6.16 was checked and seen to be consistent with the database.
Line 17:	The length of unlined iron mains is determined in the same way as lines 12 – 16 above, except that a reduction is made to account for lengths of main which have been relined but where GIS has not been updated to reflect this fact. The methodology for this adjustment is covered by internal guidance note WIC-ID-WTA-05060008 TA E6.17. The adjustment is made on the basis of an assessment made in 2005 that half of the unlined iron pipe in the former West of Scotland area and a proportion of the North of Scotland area had been relined but not shown as such on records. The adjustment is made on an area-by-area basis. The calculation was checked and confirmed during the audit and resulted in a reduction of 130.5 km in the assessed length of unlined iron pipes for AR10. This corresponds to 0.97% of the length contained in GIS.
Line 19:	The methodology for reporting bursts is commented on under Table B8. Burst data comes from the WAMS/Ellipse database. The data are cleansed to remove work that is excluded by the WICS definition for line B8.1. Duplications are also removed, where Scottish Water's staff have been called out to support site work for secondary customer enquiries.
	The number of bursts has been allocated between operational areas based on the OS grid reference for the address points of the property addresses for each reporting customer 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 proportionally so that the total number of mains bursts reconciles with the product of lines E6.16 and B8.1 Any small difference is within the quoted confidence grades for the lines.

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 Scotland-wide wide assumptions on per capita consumption, supply pipe leakage and water consumption per rateable value for unmeasured non-domestic properties. The total leakage quoted at line E6.20 (783.473 Ml/d) is consistent with line A2.30 (Top Down Total leakage – total losses) and the water balance which is built up from the 8 areas.

Line 21: The number of properties reported for low pressure is identical to line B2.9. This figure was audited in detail and our comments are given in our commentary on Table B2.

Lines 22 to 24: Data for numbers and capacities of pumping stations are abstracted from Ellipse. The asset information is consistent with the asset inventory but records any assets operational during the year. 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 Scottish Water has compared kilowatt data with known data for properties served on billed energy use. 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 gap-filling will be partly based on average flows (rather than total installed capacity), but underestimation is unlikely to be significant.

Ellipse was interrogated with direct access to the Scottish Water network. Ellipse records the capacity, Scottish Water region and operational status for each pump, although actual capacity is not always recorded. During the audit the operational status of all pumping stations was checked and all changes in status were verified by reference to change control documentation. The net change during the year was +11 due to the construction of new stations and the retirement of others. The number recorded at this line is consistent with, but not identical to, line H2.13 as it includes all pumping stations operational at any time in the year. Capacity data were not audited.

Line 25: Scottish Water has reworked its figures for AR10 leading to a scarcely significant increase in average pumping head. During our audit we saw very wide swings in a minority of the sites. We understand that Scottish Water may implement a project to improve data during the SR10 period.

For further information on Scottish Water's approach to calculating the average pumping head please see our narrative for Table E4 Line 14.

Lines 26 to 29: Data for numbers, capacities and operational areas for service reservoirs and water towers are abstracted from Ellipse.

The asset information is consistent with the asset inventory but records any assets operational during the year. The geographic split is carried out based on operational area information held in Ellipse. Capacities are recorded in Ellipse for all service reservoirs and water towers, based on design capacity.

Ellipse was interrogated with direct access to the Scottish Water network. Ellipse records the capacity, Scottish Water region and operational status for each service reservoir and water tower. The list of sites was reviewed and changes confirmed by reference to change documentation. The net change in the year was –18 due to the construction of new service reservoirs and the retirement of others. Capacity data were not audited.

The number recorded at this line is consistent with, but not identical to the sum of lines H2.9 and H2.10 as it includes all service reservoirs operational at any time in the year

Comments by Confidence Grade

Lines 1 to 4: The confidence grades given 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 5: This line is abstracted direct from Scottish Water GIS data. The grade is allocated is reasonable.

Line 6: The number of supply zones is reported as the number of regulatory supply zones defined under the Water Supply (Water Quality) Scotland Regulations and reported to DWQR. The grade is allocated is reasonable.

Lines 7-11: The Company reports confidence grades A2 for these costs. The majority of the costs are directly captured in the Company's core systems and directly allocated to assets. There are a few elements where a degree of manual allocation is required, e.g. distribution pumping, but these are based on local knowledge using the kilowatt rating of pumps and hours run. We consider the Company's reported confidence grades to be reasonable.

Lines 12 – 18, 22, 26 and 28:

The B2 grade given for these lines is identical to that for the corresponding lines in the H Tables. All of these lines come from the same source and these grades are supported.

Line 19: The confidence grade given for this line corresponds to the confidence grade for line B8.1 and is supported.

Line 20: The confidence grade, allocated (B3) mirrors the grade given for Table A2 line 2.30 and is supported.

Line 21: The confidence grade given for this line corresponds to the confidence grade for lines B2.9 and is supported.

Lines 23 and 24: These lines rely on significant infilling of capacity data and the allotted grades of C4 and C3 respectively are supported.

Line 25: Scottish Water made marked improvements during AR08 to the quality of its data for head and flow at each pumping station. We believe that a confidence grade of B3 is reasonable, consistent with that now claimed for distribution input.

Lines 27 and 29: Capacities are recorded in Ellipse for all service reservoirs and water towers, based on design capacity and the B2 confidence grade is supported.

7.6 Table E7: Wastewater Explanatory Factors – Sewerage

Commentary by REPORTER

Introduction

Key Points

- We have audited sources of physical and service cost data, the calculation of average pumping head and the methodology for compiling the table. We have checked the consistency of data with that reported in other tables in the Annual Return and the base data.

- The information reported is generally consistent with other relevant sections of the Annual Return with the exception of lines E7.1 and E7.4 where there are minor differences between the A and E tables. We believe that the differences may result from changes to table numbers between our audits and finalisation of the tables.

- The drained area at E7.6 has decreased by 6% in AR10. Scottish Water has reviewed about 700 of 800 small WWTW drained areas resulting in much more tightly-drawn drained area boundaries.

- The estimated length of lateral sewers is based on a statistical approach to the likely length of lateral sewer per dwelling of each type. Recalculation produces a different length each year, reflecting changes in housing type from published local authority data which can have little effect on actual sewer lengths in the ground. We recommend that Scottish Water review this procedure.

- The length of all sewers is based on the total length of sewer in GIS, plus a further 650km of main sewer, believed to exist but not yet in the asset inventory and now assumed to consist entirely of non-critical sewers, plus the estimated length of lateral sewers, calculated as above.

- Data on sewage pumping are poorer than that for water supply. Whereas around 85% of water pumps have capacity data in Ellipse, only about 20% of sewage pumps do so. Data on numbers, capacities and types of pumping stations have been subject to significant infilling using data from known sites to infill missing pumping capacity and average head.

- Average pumping head has increased by 2.5 metres. Scottish Water reports that this is due to additional pumping stations and better information.

- Sewage populations, drained areas, properties served, sewage volumes and loads, are all calculated to WWTW level from a variety of sources either internally held in corporate systems or taken from published external sources. We found that generally the allocations to the regions were correct with the exception of 14 WWTWs serving 4376 people which are actually in Tay but allocated in Ellipse to the Don region. These were corrected in the final version of the tables.

Audit Process

During the audit we reviewed:

- Sources of data on areas, drained areas, populations, properties and volumes
- Data and systems covering asset inventory and capacities
- Sewer collapses
- The calculation of average pumping head
- The methodology for compiling the table
- The consistency of data with that reported in other relevant tables in the Annual Return and other sources where relevant

We also audited each line of the table to confirm the audit trail back to the base data. The audit was carried out by interviewing members of Scottish Water staff responsible for the compilation of the tables and with direct, unrestricted access to data held on Scottish Water information systems.

Methodology

The methodology used varies for the different lines of the table and is described under Comments by Line where relevant below. The table covers all assets which were operational at any time in the year.

Conclusions

From our audit we concluded that Scottish Water has thorough processes in place for collecting base data for Table E7. Data checks showed the base data to be compatible with entries in the tables, with minor exceptions. Line entries in the table were consistent with other relevant lines in the Annual Return.

Scottish Water has generally provided explanations for changes in table data and disclosed material assumptions. These are detailed below in our line commentaries where relevant. We are not aware of any sensitivity analysis carried out on table data. Except where noted in detailed line commentaries, populations and connected properties, sewage volumes, lengths of sewers, numbers of collapses, pumping head, loads and asset information are consistent with other relevant lines in the Annual Return.

Comments by Line

Line 0: For AR10, Scottish Water's 8 regional operational areas are unchanged. They are based on the 32 regional council boundaries. Three unitary authorities cover more than one regional operational area, but Scottish Water's boundaries then generally follow lower local authority boundaries so that populations follow published data.

Line 1: The average resident connected population reported in Line E7.2 is 4,753,400 compared with 4,753,510 in line A2.8, (Household population connected to the wastewater service). There is a difference between the numbers which are due to rounding errors.

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 135,761. As for previous submissions the annual average figure reported in this line (86200) differs from the maximum summer monthly figure reported in Table A2.

The figure has decreased by 18%, partly because the bed space data adjustment to correspond with total bed space nights figure supplied by Visit Scotland only provided average occupancy this year. Scottish Water used 11 months at the average occupancy rate for visitors and one month at ⅔ full occupancy in line with WICS guidance.

Line 3: Scottish Water's methodology for calculating average flow is generally the same 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 93 works is used in this assessment, as last year.

Dry-weather flow component

The dry-weather flow has been assessed using the same data and methodology as in AR09 using flow records at a small sample of works. The sample was selected to include 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 consists of 93 WWTWs (including 10 PFI works).

This is a relatively small sample of works, which may limit confidence in the overall result and create a geographical bias.

The dry weather data selected might not meet a typical definition of dry-weather flow which is usually measured after a week with virtually no rain. It is possible that the results contain 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 0.39 m^3/h/d, as last year.

The estimate of dry-weather flow used in the assessment appears high. 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 component

Storm flow has been determined as the run-off predicted by a sample of existing sewer models. The data is used to generate the average storm run-off factor in terms of cubic metre per millimetre of rainfall per hectare of sewered area.

The range of predicted run-off from the models used appears to be reasonable, and is based on sewerage models. The assessment covers the whole sewered area and the rainfall is derived from the Met Office measured radar precipitation information. Precipitation data is available for each Kilometre square every 5 minutes and calculation accuracy is much improved. We commend the change..

Calculation of volume of sewage collected from dry weather and storm components

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 yearly rainfall in the report year.

Line 4: The reported total number of connected domestic properties is derived from local authority data as described above. Non-domestic properties are added from the CMA derived data and are the sum of lines A1.17 - 20. The methodology for calculating the lines is described in our commentary on Table A.

There is a difference of 25 between A.21 (2,446,969) and E7.4 (2,446,944). Scottish Water reports that the difference is due rounding errors.

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 E6.5. This is consistent with the approach adopted for AR09.

Line 6: The drained area is measured from the sewered area boundaries on the GIS system. Scottish Water has carried out further work on drained areas for individual WWTW in AR10, resulting in tighter definitions of boundaries. Although the work is not yet complete, there has been a noticeable reduction on AR09.

Movements between operational areas have followed changes in WWTW management by the operational areas. WWTWs are allocated to areas through a field in Ellipse and we were able to verify apparent anomalies for three larger works. Fourteen very small works geographically in Tay were erroneously allocated to Don, but they are so small (total population 4376) as to make little difference to the return. Scottish Water confirms that the correction has been included in the final version of the tables.

Line 7: This year annual precipitation is calculated from measurements derived from radar data issued by the Meteriological Office. Data that were previously provided as monthly averages for seven former River Purification Board areas, but are now available every five minutes for each kilometre square. The accuracy of the rainfall estimate can be brought to sewered area levels which are calculated in the same way as in AR09. The lower figure this year may include the tendency for the sewered areas to be on the drier, eastern side of each of the old river areas, as well as annual variance and the cold winter.

The AR10 figure is likely to be more accurate than the AR09 figure and we commend the change.

Lines 8 – 13 The overall length of sewer (line E7.8) reconciles with the asset inventory (sum of lines H4.1 – 4.3) and line D6.13 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.

The lengths of sewers in various categories are taken from the corporate GIS. Lengths reported include infilling for missing data, including diameter. This is carried out using rules based on experience of sewerage networks, initially using data from CCTV surveys, a digital terrain model and STC25 data. Remaining gaps are then infilled using a logical process using connectivity, for example using the diameters of adjacent known pipes. Infilling is discussed in greater detail in the commentary on Table H4 for AR09. This is not included in our commentary on the H tables for AR10 as our review of H Tables this year has been restricted to a high-level audit.

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 renovation work and 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.

During the audit the MEAV database for infrastructure assets was examined. This is the database which Scottish Water compiles and maintains for the reporting of the asset inventory and is the basic source of data for Table E7. It is downloaded from GIS, but in addition to GIS data also includes infill for missing data. Data listed included diameter, material, type (public or other, critical or non-critical), Scottish Water area, surface type and commissioning date. Using the database the base data for critical and non-critical sewers and sewage and sludge rising mains were checked and seen to be compatible with Table E7.

Line 9: The estimated length of lateral sewers was based on a relatively detailed investigation into dwelling types in Wick and a nearby rural area in North East Scotland in 2005-06. This was repeated in AR07 and annually since then. 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 different length each year, from 15364km in AR06 by stages to 16403km in AR09 but with a reduction to 16344km in AR10. The changes reflect the changes in housing type from published local authority data which can have little effect on actual sewer lengths in the ground. We recommend that Scottish Water review this procedure. Further comments are given in our commentary on Table D6.

Lines 10 – 12: The lengths of the various categories of sewer are taken from the MEAV database. The length of separate foul sewer is not reported separately in table E7. The length of all sewers is based on the total length of sewer in GIS, plus an addition for sewers assumed to exist but not yet in the asset inventory, and an allowance representing lateral sewers assumed to exist but not yet in the asset inventory, which is described in our comments on line 9 above.

While 1000 km of main sewer was reasonably added (assumed to exist but not recorded) in 2006, until AR09 any new discoveries were added into the GIS without a corresponding reduction in the 1000 km allowance. In AR10 this off-inventory sewer length was reduced to 650km to allow for all new discoveries since 2006. We commend this approach.

Line 13: The length of critical sewer at line E7.13 was checked and seen to be consistent with the database and with line H4.1. 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 2005/6 and is now updated every year. All sewers which were identified in 2005/6 as critical remain so for AR09. In addition any new sewers in AR07 AR08 and AR09 are categorised as critical if:

- they have a diameter greater than 450mm for foul sewers;
- they have a diameter greater than 600mm for storm sewers;
- their depth is greater than 4metres; or,

- they are masonry or brick

Scottish Water recognises that the methodology has 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: In the audit for B8 Lines 11 and 16 we reviewed the collation and processing of data for sewer collapses for the return. The same spreadsheets are used to determine the splits to the operational areas by using the address points given in the WAMS data and a GIS overlay with the boundaries of the areas.

The methodology for determining sewer collapses is unchanged, with data being obtained via the WAMS/Ellipse database. The work orders are attached to addresses and 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. Reports without location codes were spread pro-rata to the eight areas. This figure does not match that in Line B8.10 as it includes private pipework excluded from the B table.

In AR10 there were 185 collapses that could not be allocated to a region, 0.9% of the total, which were spread pro rata across the regions.

Lines 15 to 21: The audit for these lines was undertaken in conjunction with that for Line E4.14, and the methodology for pumping head and power is the same.

In AR09 Scottish Water assembled all the data it had available from its Ellipse asset database and its telemetry database to calculate average pumping head. For AR10 Scottish Water reports a significant increase of 2.5 metres. Scottish Water's commentary notes that 24 new pumping stations were added in the Year.

In the audit we reviewed the work required to assemble the data for AR10 and the amount of data gap fill needed to complete the calculation of the asset data. We confirmed that the new pumping stations are all small and examined Ellipse data for a sample of three. We confirmed that the available flow data is unchanged in ,most cases.

In inspecting the Ellipse records we noted that data for assets can be entered into several levels that correspond to the complexity of the site. For those we inspected, one had no details added. For other sites information for these new installations was incomplete and the date of installation or construction of the pumps was not input at all.

In our audit of water pumping stations we note that there can be very large swings in the data as it is refreshed, emphasising the uncertainty of some data. Sewage pumps in particular tend not to be metered; neither are hours run centrally collected. Flow data for the average head calculation in AR10 are therefore the same as in AR09.

Data in Ellipse for sewage pumping are much poorer than for water supply. Whereas around 85% of water pumps have data in Ellipse, only about 20% of sewage pumps have. Scottish Water hopes to improve the data, possibly through a particular project in the SR10 period.

For clarity the methodology and information given in AR09 are reproduced below:

Data for numbers, capacities and types of pumping stations were abstracted from Ellipse. Data from known sites survey were used to infill missing Ellipse data pumping capacity and average head. The asset information was consistent with the asset inventory but recorded any assets operational during the year. The geographic split was carried out based on operational area information held in Ellipse. Data infilling was carried out on pumping capacities by assuming that the spread of capacities among unknown sites was the same as the spread among known sites for that operational area. The proportion of missing capacity data was 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 Scottish Water compared kilowatt data with known data for properties served on billed energy use. Pumping capacity was taken as design capacity recorded on Ellipse, except where operational data showed greater average flows. Where this was the case these were substituted. Therefore gap-filling was partly based on average flows (rather than total installed capacity), but underestimation was thought unlikely to be significant.

Ellipse records the capacity, Scottish Water region and operational status for each pump, although among a small sample of sites examined in AR09 a significant proportion did not have the actual capacity recorded.

The asset data are consistent with the asset inventory but report any assets operational during the year. Pumping stations operated under PFI concessions have been excluded.

Line 17: In common with water supply services, Scottish Water completed a substantial survey exercise in AR09 to improve the accuracy of the average pumped head. The methodology used is described in our commentary on Table E4. Our sample audit, predominately of water pumping stations, showed that Scottish Water was able to justify the changes that it had made since AR09.

Lines 18 to 21: Ellipse does not distinguish between combined and stormwater pumping stations. Scottish Water maintains a spreadsheet in which type is listed. This includes categories for combined and stormwater pumping stations. During the audit the spreadsheet totals were reconciled with lines E7.18 – 21 and with lines H5.1 and H5.2.

Lines 22 to 23: In the report year the company has reported the number of CSOs consistent with Table H4 but excluding emergency overflows and those discharges which occur from sewage treatment works. This explains the difference between the number reported in table E7 and the number of CSOs reported in table H4.

Data are extracted from Ellipse. Some reductions in the reported numbers have occurred as the CSO programme leads to better information and removals due to investment projects. During the audit a database extract from GIS was compared and reconciled with the total number of CSOs and emergency overflows. The number of emergency overflows was not separately audited.

Lines 24 and 25: The number of operational sewage treatment works reconciles with that in line E8.8. 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 & 4: 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 2: This line is assigned confidence grade C4, reflecting the uncertainty in non-resident connected population. We consider this to be reasonable.

Line 3: Scottish Water has allocated a grade of C4 to this line, this is inconsistent with the B3 grade allocated to line A2.51 which is calculated in a similar way.

Line 5: The operational area boundary figures are derived from geographical data for the operational regions by GIS and a high confidence grade should be expected. A1 is reasonable.

Line 6: The drained areas are more tightly drawn this year. A confidence grade of B2 is reasonable.

Line 7: Annual precipitation is taken from the same Met Office source but in AR10 this was based on weather modelling from actual radar-measured precipitation – every five minutes for each square kilometre. Scottish Water claim a confidence grade of A2 which is reasonable as there is still some estimation at drained area boundaries.

Lines 8 – 9: These lines both include estimated lengths of lateral sewer and the C4 confidence grade allocated is the average of the B3 and C5 grades allocated for lines H4.1 and H4.2 (critical and non-critical sewers). This grade is supported.

Lines 10 – 12: These lines are abstracted directly from GIS and do not include any estimated length, so the claimed confidence grade of B2 is supported. Lengths of sewer over 1000mm in diameter have been supported by infrastructure surveys.

Line 13: The length of critical sewer no longer includes any addition for off-inventory sewers and we support the claimed confidence grade of B3.

Line 14: Scottish Water claim confidence a grade of B3 for collapses across the regions this year, against A2 in AR09 and B3 in AR08. Although we accepted the change in AR09 from B3 we noted an inconsistency with Line B8.10, still at B3. We support the reversion to B3 this year.

Line 15, 18 & 20: Data are extracted from Ellipse, with no infill or estimation and the claimed confidence grade of B3 is accepted.

Lines 16, 16a, 19 & 21:

Ellipse data are subject to considerable infilling of capacities and we support the claimed confidence grade of C4.

Line 17: The allocated grade of C4 is accepted for this line. This is a lower grade than for drinking water pumping head, reflecting an increased degree of data infill and this grade is accepted.

Lines 22 - 23: The confidence grade claimed remains at A3, as last year. However we see no reason why the information on CSOs should be any better than that on sewage treatment works and suggest that B3 is more appropriate.

Line 24: The number of WWTWs is drawn directly from the Ellipse database. Scottish Water have allocated a grade of B3, which is inconsistent with the grades allocated to lines H5.3 – H5.7, where data are drawn from the same source. We would support a grade of B2.

Line 25: This line is derived from the suite of spreadsheets for flows and loads to WWTW. A confidence grade of B3 is reasonable.

7.7 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.

Audit Process

From AR09 Scottish Water has continued to refine the drainage boundaries for the smaller WwTWs. Information for a WwTW is assembled centrally in the GIV department and then sent to the Regional Operational Planners for them to check. Generally, boundaries have been more tightly drawn.

In the audit, we examined how each works is listed from Ellipse and then the operational data is assembled from drainage areas using GIS and by population using address points and population data from local authorities.

Methodology

The methodology used in AR10 is the same as that used in AR09.

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.

In AR09, Scottish Water has been working to improve its WwTW information in Ellipse through the drainage area work reviewed in the audit process. The exercise requires input from Regional Operational Planners, and we understand that about 100 small WwTW remain to be completed.

The reported loads are consistent with Table A2. Loads are based on 60g BoD/head/day as specified by the WICS.

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 AR08 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 Scottish Water by SEPA for the year ending 31st March 2010.

Conclusion

Data for this table are partly derived from spreadsheets of flows and loads compiled by GIV for Table A2. Other data are taken from SEPA published data for WwTW performance which also used in Table B8. We believe that these sources are reasonably reliable and accurate within the stated confidence grades.

In general, the return figures show small changes from AR09 commensurate with capital intervention, with movements from small works to larger ones and with more installed treatment.

The work on small WwTW drainage boundaries has resulted in lower identified populations served and a consequent reduction in calculated BOD load.

The loading return figures show a decrease of loading in AR10 compared with AR09 for Size Band 6 (large works) and an increase to Size Band 5 which reflects the reallocation of certain works out of the Size Band 6 based on drainage boundary clarifications (see the discussion for Table E9).

Comments by Line

Lines 1 to 20: The data in Table E8 lines 1 to 20 were 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.
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 the Section E Overview. The costs are consistent with the direct costs and functional expenditure reported in Table E2 for sewage treatment.

The majority of costs for WwTW are directly allocated to the specific asset code, for the report year this was in excess of 88% of the total costs. Where this is not possible costs are allocated by local managers. For septic tanks, costs are allocated to a group of septic tanks linked to a works team. Costs are spread across the number of septic tanks within the group based on load.

General and support expenditure is allocated to specific activities where possible, with the remainder being distributed between treatment works in proportion to the direct employment costs allocated. This is done on the assumption that general and support expenditure is mainly to support staff as opposed to other expenditure.

We have reviewed the costs included in table E8 for the report year. Costs are allocated to the process categories in line with the works identified for each category.

The overall movement in costs for sewage treatment at £4.43m are discussed in our report on table E2. These mainly relate to employment costs, power and chemical costs along with increased insurance claims and increased VR and restructuring costs. Scottish Water has reported a misallocation of G&S costs for 2008/09 which understated costs to septic tanks by £0.7m and overstated costs to other treatment categories by the same amount. This has been rectified for the report year. Other movement in costs for the report year between treatment categories mainly relate to movements in works between categories. These are explained in Scottish water's commentary

Comments by Confidence Grade

We consider that the confidence grades reported by Scottish Water are reasonable.

7.8 Table E9: Large Sewage Treatment Works Information Database

Commentary by REPORTER

Introduction

Key points

- Twenty large treatment works are reported. The report excludes the PPP works. Dunbar, Galasheils and Iron Mill Bay WwTW that were listed in AR09 have been excluded in AR10.
- The data sources are consistent with other sections of the return, including the sewage loads in Section A.

Audit Process

In addition to the audit work for Table A2 and Table E8, we looked at the reasons for some WwTWs being newly excluded.

Methodology

The size of works has been determined by the population equivalent of the total load received. The load received is calculated using the same methodology described for Table A2.

Of the WwTWs removed from the list of larger works:

- Dunbar drainage area has lost a major trade effluent with a population equivalent of around 7000;
- Galasheils loading has been reduced because, for operational reasons, sludge loads have been diverted elsewhere;
- Iron Mill Bay and Dunfermline WwTWs were not clearly delineated in AR09, so that both were included in the E9 table. The boundary has now been clarified and Iron Mill Bay no longer qualifies.

Compliance data are taken from published SEPA figures and there were no anomalies to be commented on this year.

Conclusion

Data used in this reporting table are partly derived from Scottish Water's own data spreadsheets compiled by IDR and used elsewhere in the return. Data not so derived comes from SEPA published data.

We believe these sources to be reliable and accurate within the confidence grades given.

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 cost information is extracted for each of the major sewage treatment works. The power costs are the remaining costs once any sludge treatment power costs have been removed. We have described the methodology for this in our overview to the E tables.

Sludge treatment costs are removed before completion of these tables. So sludge treatment costs are zero.

For works where the terminal pumps are on the WWTW an estimate of 30% of the power costs are attributed to terminal pumping. We understand that this is on the basis of management estimate but were unable to audit a calculation to support this.

In the report year general and support expenditure which cannot be directly allocated to a specific activity has been distributed between treatment works in proportion to the direct employment costs allocated. This is done on the assumption that general and support expenditure is mainly to support staff as opposed to other expenditure.

Comments by Confidence Grade

We consider the confidence grades reported by Scottish Water to be reasonable.

7.9 Table E10 – Sludge Treatment and Disposal

Commentary by REPORTER

Introduction

Key Points

- 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 Scottish Water's sludge treatment centres.
- Total operating costs for sludge treatment and disposal have been allocated through the ABM process described in Section E1.
- Sludge treatment and disposal costs have not been audited in AR10.
- Sludge treatment and disposal costs have increased by £0.9M to £12.4M for the report year. The estimated sludge quantity has reduced slightly from 21.4 ttds in 2008/09 to 20.4 ttds in 2009/10.
- Sludge treatment and disposal costs have increased by £0.9m to £12.4m for the report year. Of this increase £0.5m was related to G&S costs.

Audit Process

The data for this table is largely the same as that used for deriving Table A2 and the audits were carried out in conjunction with those for populations and loads.

Sludge is treated or part treated at sludge conditioning and sludge treatment centres before ultimate disposal. All movements are controlled using the Gemini sludge management system (except one discharge to one PPP works via a metered pipeline) and we were shown the spreadsheets where the data is down loaded and collated to provide the quantitative return figures.

We were able to follow an audit trail through the data to the reported quantities by outlet.

Methodology

The methodology for estimating and allocating sludge production is outlined in our report on table A2. The return figures are consistent.

The sludge quantities and sludge disposal costs reported in this table are limited to sludge disposed of by Scottish Water. The table excludes sludge disposed of through PPP concessions.

The resident population reported is the total resident population served by Scottish Water's 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.

During the audit we found one WwTW at Portsoy (Ellipse code STW001423) that had been allocated to Nigg sludge treatment centre, a PFI site. However, this works is a sea disposal point and produces no sludge, only grit and screenings for disposal. The effect on the return figures is below the threshold for the confidence grade (Portsoy population 1973, Nigg 97,860, Scottish Water total 2,599,000) but points up potential unreliability of Ellipse data. We recommend that Scottish Water reviews the Ellipse data system for asset information purposes.

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. Sludge is moved by OTW, Scottish Water's contractor, and all tanker loading is metered. At Galashiels, sludge leaves the site by trailer for disposal by OTW's local subcontractor to his own farmland, and trailer load quantities may be variously underestimated up to 8% maximum or 439 tds at this treatment centre only.

The reported quantity of sludge is the estimated raw sludge production before it is treated. Treatment processes applied generally result in some reduction in sludge mass, and Scottish Water applies a 35% uplift to digested sludge quantities to give raw sludge figures. Scottish Water reported increasing difficulties operating the ageing sludge treatment plants when developing the Draft Business Plan and in the audit. We feel that standard uplift factors for treatment efficiency may be optimistic and cause a degree of under-reporting. However, the effect will be within the accuracy level for the confidence grades claimed.

The quantity of sludge reported is that treated and recycled or disposed of from Scottish Water's operational sites only.

Sludge data and population figures given in Table E10 are derived from the same base data and spreadsheets used in other parts of the return, and are therefore consistent. The methodology is the same as last year, and the figures are therefore also consistent with AR09.

Operating costs have been allocated through the ABM process described in Section E Overview and the line commentary below. All sludge disposal is undertaken by contractors.

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

For some sites sludge is moved from one site to another for treatment and disposal. Costs are traceable between works showing a corresponding negative and positive cost as sludge moves from one site to the next. Costs are included for the final treatment centre.

Generally works have only one route of disposal so the costs are allocated to the correct disposal category. One works (Traqueer) has more than one route where 90% of the sludge goes to composting and 10% to farmland. The costs are allocated on the percentage split.

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

Outlet	Ttds (rounded)		Costs £m	
	2009-10	2008-09	2009-10	2008-09
Farmland Untreated	0.0	0.0	0.0	0.0
Farmland Conventional	5.4	6.4	3.3	3.2
Farmland Advanced	12,5	13.0	6.4	6.2
Incineration	0.0	0.0	0.0	0.0
Landfill	0.5	0.6	0.8	0.9
Composted	1.4	1.5	1.6	1.2
Land Reclamation	0.6	0.0	0.3	0.0
Other	0.0	0.0	0.0	0.0
Total	20.4	21.4	12.4	11.5

There has been a reduction in sludge quantity overall of 5%, which can possibly be explained by normal annual variation. The biggest decrease in disposal routes is to farmland conventional, although the decrease is less than in AR09. Only the land reclamation route increased in the year when a particular opportunity opened; the other three routes showed a small decline.

Conclusion

The data is taken from Scottish Water's corporate data and the operations are carefully and effectively controlled for environmental reasons. The Return figures are likely to be reliable within the assumptions made for solids reduction in treatment.

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 comparable with AR09.

Lines 3-11: Operating costs have been allocated through the ABM process described in the overview to Section E.

The ABM system includes sludge treatment and disposal cost centres linked to assets. Costs for intersite tankering, sludge treatment and sludge disposal are collated to give a sludge cost by sludge treatment centre.

The ABM data is linked to the sludge movement data from Gemini waste management system to produce E10 cost analysis.

Where sludge goes from a sludge treatment centre to more than one disposal route costs are allocated on the basis of the % volume to each route. This assumes that the cost is the same for each disposal route. The use of a secondary disposal route is usually only for a small percentage of the sludge or to deal with a temporary loss of a disposal route.

General and support costs (from table E2) were allocated between outlets in proportion to the direct costs.

The overall cost for sludge treatment and disposal increased by £0.9m for the report year to £12.4m. Scottish Water shows the variance in costs by disposal route for the report year as compared to 2008/09 and explains the main reasons for variance in their commentary.

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 accept a confidence grade of B3 for the sludge quantities against individual works, whilst noting, as in AR09, 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 cost allocations.

7.10 Table E11: Operating Costs and Efficiency– Management & General

Commentary by REPORTER

As agreed with WICS this table was not audited this year.

8. SECTION G – INVESTMENT PLAN

8.1 Overview

Scottish Water has populated Tables G5 and G6 with detailed project information which is summarised by programme area in Tables G1 and G2 and by purpose code in Tables G3a to G4b.

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 and Table K56 from the Annual Return 2005-06. We concluded that the data given in Tables G5 and G6 are a fair and representative picture of the programme as it stood at 31st March 2010 and are valid and sufficiently accurate for the purposes of the other G Tables.

We were requested by WICS to comment on Scottish Water's procedures for the allocation of capital costs to functional areas and have included our comments in our commentary on Table G5.

Scottish Water reports substantial completion of Q&S2 outputs in Table G7. Virtually all remaining Q&S2 projects are now under construction.

Scottish Water reports delivery of its Q&S3a outputs in Tables G8 and G9. In Table G8, most Ministerial Objectives have met their targets for the investment period. Exceptions are works where odour problems are addressed, improvement of disinfection, the number of abstraction zones with reduced abstraction, number of UIDs improved, number of WWTWs improved to meet new consent conditions and the number of first time wastewater provisions. There has been some improvement in performance against serviceability targets and the number of pollution incidents continues to show a downward trend. In Table G9 performance on the number of properties with unplanned interruptions, bursts per 1000km of main and number of unsatisfactory intermittent discharges remain below target.

Key Points

We have reconciled outputs, capital costs and operational impacts between the various G tables, the Capital Investment Report for March 2010 and base data in CIMS. It was not possible to reconcile total operating costs in tables G1 and G2 with Tables E1 and E2.

The Q&S2 programme is virtually complete. Only 14 Q&S2 projects are unfinished, with a total estimated cost of £79m, including £46m post 2009-10. Virtually this entire overhang is concentrated in four projects which are currently being constructed, including 1243 - Dunoon Sewerage Scheme with post 2009-10 expenditure of £29m.

The Q&S3a programme is approaching completion. Completed projects are 82% by number and 56% by value. Projects under construction are 12% by number and 33% by value and projects at Capex 3 approval or before are 6% by number and 11% by value. Post 2009-10 expenditure on Q&S3a projects (overhang) is estimated as £192m. The bulk of overhang cost is concentrated in a comparatively small number of projects. These include in particular Glencorse New WTW, WTW upgrades where there have been difficulties in defining options and projects in the UID improvement programme. There remains the potential for delay to project completions and output delivery, due to the impact of third-party issues on a number of projects.

Proportional allocation of costs to outputs has generally been correctly carried out. Confidence in proportional allocation for the Q&S2 programme is not as great as for the Q&S3a programme. Not all Q&S2 projects have had proportional allocation revisited to realign allocations to drivers with the actual cost of meeting that driver. There is evidence that proportional allocation has not been revisited at later Capex stages for some Q&S2 projects, despite changes to project content.

Very large positive and negative programme adjustments appear in the Q&S3a programme. Project 40032 – Capital Maintenance Overhang Removals and project 36660 - SW Liability Register– SWS Programme show very large positive and negative cost allocations, including +275% to drinking water quality and –135% to water non-infrastructure. These adjustments affect the totals allocated to drinking water quality and water non-infrastructure capital maintenance, significantly skew the allocation of costs between programme areas and drivers for 2009-10 and post 2009-10 expenditure and result in a skewed picture of where expenditure has actually been made in Scottish Water's investment programme.

For the last 2 years Scottish Water has employed a risk analyst who develops the risk management autocodes and the information within them. They are generally, but not exclusively, 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. Scottish Water reports that it is becoming more involved in understanding SWS and CID's risks. SWS and CID continue to hold significant risk items in their project estimates. In addition Scottish Water continues to hold risk items, where it believes that it may be liable. As for last year, Scottish Water's risks, both for Q&S2 and Q&S3a, have been consolidated into a single project (Autocode 40020) in the Q&S3a programme. However, this year Scottish Water has also set up a "Liability Register" (Autocode 36660) which includes liabilities that it may incur on the SWS contract, including any gain or pain-share that may have to be paid. In addition Scottish Water has identified some emerging risks that have not been incorporated into either of the above codes as yet.

We have concluded that there is scope for a more comprehensive set of output codes and measures for capital maintenance.

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.

Information in CIR Q4 and Tables G5 and G6 on estimated outturn cost and completion date in general correspond to the project manager's latest best estimate (LBE), although exceptions were noted.

During our audits we continued to note that the focus of SWS's staff involved in projects remains on contract cost, rather than overall project cost. We found some examples where significant external risk factors (such as the need to agree consents or reach agreements with third parties) which could affect project completion dates were not included in project risk registers, which focus on costed risks. We recommend that project risk registers should be reviewed to ensure that they contain all risks, including those borne by Scottish Water, particularly where these could affect completion, but do not affect outturn cost.

Scottish Water has a rigorous and well-managed process for identifying and submitting relevant projects for regulatory sign-off and monitoring progress. Data in lines G7.13 toG7.16 were consistent with the data in Scottish Water's sign-off monitoring spreadsheet.

Progress has been made in achieving regulatory sign-off. Work has been completed at virtually all of the Q&S2 projects requiring SEPA sign-off, but a number of cases remain where work on a particular site cannot be achieved because work is needed at a linked site. This is a factor in delays in sign-off. Completion of 6 Q&S2 projects is forecast to be after 31st March 2010. Scottish Water has submitted 1140 projects to SEPA for sign-off, of which 1101 have actually been signed off.

Scottish Water has made good progress with the sign-off of the Q&S3a programme during the year. Of 877 projects requiring sign-off, 788 have reached Beneficial Use, 698 have been submitted for sign-off and 657 (75%) actually signed off. 10 percent of Q&S3a projects requiring sign-off were uncompleted at the year-end.

Most Ministerial Objectives delivery targets have been met for the investment period. Exceptions are works where odour problems are addressed, improvement of disinfection, the number of abstraction zones with reduced abstraction, number of UIDs improved, number of WWTWs improved to meet new consent conditions and the number of first time wastewater provisions.

Comparing reported serviceability performance with the Delivery Plan target for March 2010, performance on 8 of the 11 outputs in Table G9 is on target or better. Performance on the number of pollution incidents has continued to show a downward trend and is below the target for March 2010. Performance on the number of properties with unplanned interruptions of greater than 12 hours, bursts per 1000 kilometre of mains and number of UIDs remain below target.

8.2 Tables G1 & G2 – Investment Plan Summaries

Commentary by REPORTER

Introduction

Key Points

We have audited the manipulation of capex data from Tables G3a, G3b, G4a, G4b, G5 and G6, the assessment of opex impacts, the allocation of costs to drivers and the assessment of new obligations.

Capex data in Tables G1 and G2 were fully reconciled with Tables G3a to G4b and are therefore concluded to be fully consistent with Tables G5 and G6. The tables present a realistic view of the investment programmes as they stood on 31st March 2010.

Operating cost impacts are fully consistent with the base data in CIMS and Tables G5 and G6. Total operating costs in Tables G1 and G2 are consistent with information in Tables E1 and E2.

Proportional allocation of costs to outputs has generally been correctly carried out. Confidence in proportional allocation for the Q&S2 programme is not as great as for the Q&S3a programme. Tables G1 and G2 have been reconciled with Tables G3a, G3b, G4a, G4b, G5 and G6 with regard to project drivers. The allocation of expenditure by investment type and output in Tables G1 and G2 is reliable within the confidence grades allocated to these tables.

Scottish Water has entered a number of projects under new obligations. At the time of our audit we were informed that these lines would have zero entries. We have not therefore audited these lines. From Scottish Water's narrative we understand that they relate to projects being promoted through the seven stage process and are therefore known to WICS. Some, but not all, of the water projects cost estimates have been audited as part of that process by ourselves.

Grants and contributions within Tables G1 and G2 had been reconciled with the base data within the accuracy limits of the suggested confidence grade.

Very large positive and negative programme adjustments in the Q&S3a programme, principally affecting drinking water quality and water non-infrastructure capital maintenance, significantly skew the allocation of costs between programme areas for 2009-10 and post 2009-10 expenditure. This issue is discussed in our commentary on Table G6.

We recommend a reduced confidence grade of B3 for Tables G1 and G2.

Audit Process

Tables G1 and G2 summarise detailed project data captured in Tables G5 and G6 and summarised by output delivery in Tables G3a, G3b, G4a and G4b. For this section of the audit we checked:

- The manipulation of capex data from Tables G3a, G3b, G4a and G4b

- The calculation and apportionment of opex impacts from CIMS data
- Total operating cost in comparison with Tables E1 and E2
- Capex costs and opex implications associated with new obligations since the Final Determination
- The assessment of grants and contributions from data held in the Finance General Ledger

Adopted assets and nil-cost assets were not audited.

Methodology

Capex Costs

Tables G1 and G2 summarise by programme area the investment reported at project level in Tables G5 and G6 by purpose code. To compile Tables G1 and G2, Scottish Water first uses a data extract from CIMS to compile Tables G3a, 3b, 4a and 4b and the data in these tables is then used to compile Tables G1 and G2. The manipulations are as follows:

For Q&S2 projects, data on costs and output codes are taken from CIMS and used to compile Tables G3a and G3b. For Q&S3a projects, data on costs and output codes are taken from CIMS and used to compile Tables G4a and G4b. Table G1 is then compiled from Tables G3a and G4a, while Table G2 is compiled from Tables G3b and G4b.

Tables G1, G2, G4a and G4b do not include the reported expenditure on the Q&S2 programme prior to 2006-07.

Opex Costs

Additional opex for each project is calculated using an Access database download of CIMS data showing Beneficial Use dates and the current and previous year's opex impact data. The data consists of a mixture of actual opex impact (for completed projects) and forecast opex impact (for projects where actual opex costs have not yet been reassessed). During the preparation of these data Scottish Water run consistency checks to check that opex impact has been removed for stopped projects, identify anomalies in capex submissions (such as missing data and large changes), and compare forecast opex impacts with those forecast in the Business Plan.

Each project records the total opex impact and percentages to the appropriate drivers and these data are used to apportion opex impact to the appropriate parts of the programme. Opex impact is apportioned in the same proportions as capital costs and is taken from the most recent approved capex submission.

After checking, opex impacts are then apportioned on a project-by-project basis to water or wastewater using output codes and opex impact is apportioned to financial years by spreading the total impact pro-rata over the two relevant years using 365 days from the Beneficial Use date. This is earlier than the Capex 5 completion date shown in Table G5 and G6. Opex impacts are only revisited for capex submissions and are not updated in between. However when projects have been in operation for about a year CIMS is updated with the actual, measured opex impact, which may be significantly different from that forecast.

The total operating expenditure for the year is reported in table E1 line 20 for the water service and E2 line 19 for the sewerage service. We have audited these figures and report on them in our report on Section E.

The operating expenditure relating to new assets for the report year is calculated by taking the predicted opex for new schemes from CIMS. This has been generated using the Opex Model or similar models using unit costs where appropriate. The calculation takes account of the proportion of the year that the company has had beneficial use of the scheme.

The base opex is calculated as total operating expenditure less predicted new operating expenditure.

From our audits we note that the predicted opex is not automatically allocated to the works where the new scheme is introduced. Managers identify additional costs required, generally after 6 months of operation, and apply for these to be added to their budgets. The additional opex allocated to budgets is generally less than the predicted opex, the difference being absorbed as efficiency.

New Obligations

Scottish Water has entered a number of projects under new obligations. At the time of our audit we were informed that these lines would be have a zero entry. We have not therefore audited these lines as submitted. From Scottish Water's narrative we understand that they relate to projects being promoted through the seven stage process and are therefore known to WICS. Some, but not all, of the water projects cost estimates have been audited as part of that process by ourselves. We have no knowledge of any of the wastewater projects.

Grants and Contributions

There has been no change in the methodology from AR09. No grants are reported and contributions relate mainly to the infrastructure charge. Scottish Water reports no 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 England and Wales however, Scottish Water pays developers a "reasonable cost contribution" of providing infrastructure for properties [The Provision of Water and Sewerage Services (Reasonable Cost) (Scotland) Regulations 2006 (WSRC2006)]. More details of the infrastructure charge are given in our commentary on Table E1.

When each new connection is approved a unique job number is raised which records both invoicing and income for that job. The PeopleSoft system holds these data on a site-by-site basis, is reconciled on a monthly basis with the General Ledger and is used as the basis of data on income received. The income appears in the year in which it was invoiced.

Contributions are held in the Finance General Ledger in two account codes; 8326 for infrastructure projects and 8701 for non-infrastructure projects. Figures reported are the actual receipts reported by the Finance department. Finance maintains a logging spreadsheet which records the receipt of contributions and their release to individual projects. Transactions are tagged to record whether a project is in the Q&S2 or Q&S3a

programme. To produce Table G1 and G2 lines 17 – 19, AIM takes a download of the finance spreadsheet and allocates each project to water or wastewater by reference to the project output codes. The spreadsheet is then filtered to remove contributions which are not relevant to the regulatory investment programme and a pivot table is used to produce Table G1 and G2 lines 17 – 19 directly.

Conclusions

Allocation of Costs to Drivers

We have commented on the allocation of Capex to purpose codes under our commentary on Tables G5 and G6. We concluded that for Q&S3a projects, proportional allocation of costs to outputs was robust and had generally been correctly carried out. 32% of Q&S3a projects have more than one driver and so have proportional allocation applied.

Proportional allocation of costs to drivers is less robust for Q&S2 projects. Not all Q&S2 projects have had proportional allocation revisited to realign allocations to drivers with the actual cost of meeting that driver. There is evidence that for some Q&S2 projects proportional allocation has not been revisited at later capex stages, despite changes to project content. Confidence in allocation of costs to drivers is therefore lower for Q&S2 expenditure than for Q&S3a expenditure. 22% of Q&S2 projects have more than one driver and so have proportional allocation applied.

Capex

Tables G1 and G2 summarise expenditure in the four years 2006-10 and the total post 2009-10. For the Q&S3 programme, Scottish Water also reports expenditure of £24.3m prior to 2006-07. Expenditure is estimated in money of the day allowing for inflation.

Programme Adjustments

The Q&S3a programme contains two projects which result in a significant skewing effect on the allocation of costs to programme areas in Tables G1 and G2. These are project 40032 - Cap Maintenance Overhang Removals and project 36660 - Scottish Water Risk Contingency, but with very large positive and negative cost allocations, including allocations of +235% to drinking water quality and –135% to water non-infrastructure. We have commented further on these allowances in our commentary on Table G6. These adjustments are confusing and result in a skewed picture of where expenditure has actually been made in Scottish Water's investment programme.

Compatibility of Table G1 Capex with G3a and G4a

Table G1 lines 2 – 5 are calculated by summing the relevant lines in Tables G3a and G4a, taking into account grants and contributions. Line G1.2 (infrastructure) is the sum of line G3a.5, plus 60% of lines G3a.1-4. Line G1.3 (non-infrastructure) is the sum of lines G3a.6, G3a.7 plus 40% of lines G3a.1-4. We checked and confirmed that these summations had been correctly made.

Lines 7, 9 and 11 are direct transfers from lines in Tables G3a and G4a. We checked and confirmed that these transfers had been correctly made.

Total expenditure in Table G1, taking into account grants and contributions, reconciles to the sum of net expenditure in Table G3a and G4a.

Compatibility of Table G2 Capex with G3b and G4b

Table G1 lines 2 – 5 are calculated by summing the relevant lines in Tables G3b and G4b, taking into account grants and contributions. We checked and confirmed that these summations had been correctly made.

Lines 7, 9 and 11 are direct transfers from lines in Tables G3b and G4b. We checked and confirmed that these transfers had been correctly made.

Total expenditure in Table G2, taking into account grants and contributions, reconciles to the sum of net expenditure in Table G3b and G4b.

Compatibility of Tables G1 and G2 Capex with Table G5

All capital expenditure in Table G5 is carried forward to Tables G3a and G3b and then to Tables G1 and G2 for the relevant years. Tables G1, G2, G3a and G3b do not include the reported expenditure on the Q&S2 programme prior to 2006-7.

The total capital expenditure in Tables G1 and G2 is compared below to that allocated in Table G5, after allowing for grants and contributions:

Comparison of Tables G1 and G2 Capex with Table G5 (£m)

	2006-07	2007-08	2008-09	2009-10	Post 2010-09
Table G1 (Q&S2)	77.004	22.338	1.943	3.605	1.195
Table G2 (Q&S2)	96.071	42.141	23.086	44.935	45.061
Table G1 + G2 (Q&S2)	173.075	64.479	25.029	48.540	46.256
Table G5	173.075	64.479	25.030	48.540	46.256
Difference (G5-(G1+G2))	0.000	0.000	0.001	0.000	0.000

The slight differences in some totals are due to rounding error.

We are satisfied that total Q&S2 capex in Tables G1 and G2 is compatible with Table G5.

Compatibility of Tables G1 and G2 Capex with Table G6

All capital expenditure in Table G6 is carried forward to Tables G4a and G4b and then to Tables G1 and G2 for the relevant years. Tables G1, G2, G4a and G4b do not include the reported expenditure on the Q&S3a programme prior to 2006-07.

The total capital expenditure in Tables G1 and G2 is compared below to that allocated in Table G6, after allowing for grants and contributions:

Comparison of Tables G1 and G2 Capex with Table G6 (£m)

	2006-07	2007-08	2008-09	2009-10	Post 2010-09
Table G1 (Q&S3a)	128.366	329.599	406.344	375.689	76.736
Table G2 (Q&S3a)	111.846	230.845	254.923	187.049	113.459
Table G1 + G2 (Q&S3a)	240.212	560.444	661.267	562.738	109.195

	2006-07	2007-08	2008-09	2009-10	Post 2010-09
Table G6	240.211	560.445	661.265	562.737	190.194
Difference (G6-(G1+G2))	-0.001	0.001	-0.002	-0.001	-0.001

The slight differences in some totals are due to rounding error.

We are satisfied that total Q&S3a capex in Tables G1 and G2 is compatible with Table G6.

Opex

During the preparation of the tables, Scottish Water ran consistency checks on opex impact as described in Methodology above on 13% of the projects in the investment programme.

During the audit we checked a small sample of 6 projects in Scottish Water's data extract of opex impact and Beneficial Use dates and confirmed that in each case opex and its apportionment had been calculated as described in methodology above. The data in the extract were also shown to agree with the data on capex forms.

The pivot table data query for opex impact lines 8, 10 12 in Tables G1 and G2 was reproduced from Scottish Water's opex impact spreadsheet and these lines were substantiated.

We are satisfied that opex impacts for quality, enhanced service and growth in Tables G1 and G2 are consistent with the base data in Table G5 and G6.

Base opex in the tables is calculated by taking the total operating expenditure for the programme and year and deducting opex impacts to give an inferred base opex. We recommend that WICS provides further advice on whether this is the correct approach or whether the cumulative opex from the base year for the Business Plan should be reported.

The reconciliation of the E Table lines with the Annual Accounts is covered in our commentary on the E Tables.

New Obligations

At the time of our audit we were informed that these lines would have a zero input this year and so they have not been audited.

Grants and Capital Contributions

For the audit we reviewed three projects in the finance contributions monitoring spreadsheet. For each project the spreadsheet showed the project number and name, whether the project belonged to the Q&S2 or Q&S3a programme, the amount of contribution received, the date of receipt, the amount of contribution released, the date of release and the reason for the contribution. In the three cases audited the contributions related to one mains and one sewer diversion, made under NRSWA powers, and one contribution from a local authority towards the cost of a flood relief project. For each project the General Ledger was checked and the data were seen to be consistent.

Using the monitoring spreadsheet, by reference to output codes, line 19 in Tables G1 and G2 was reproduced. For Q&S2 total grants and contributions was reconciled exactly. For Q&S3a a difference of £15,000 was seen between the spreadsheet and line 19. This was investigated and found to be due to a difference in the allocation of costs to water and wastewater within the spreadsheet, compared with that used in the pivot table and Tables G1 and G2.

We concluded that grants and contributions within Tables G1 and G2 had been reconciled with the base data within the accuracy limits of the claimed confidence grade.

Overall Conclusions

From our audits we have concluded that capex and opex data in Tables G1 and G2 have been correctly compiled, either from Tables G3a, G3b, G4a and G4b, or directly from other sources and are compatible with the data in Tables G5 and G6 and the base data in CIMS. The tables present a realistic view of the investment programmes as they stood on 31st March 2010.

Tables G1 and G2 have been reconciled with Tables G3a, G3b, G4a, G4b, G5 and G6 with regard to project drivers. We have also confirmed that all expenditure in Tables G5 and G6 is reported in Tables G1 and G2. We have therefore concluded that the allocation of expenditure by investment type and output in Tables G1 and G2 is reliable within the confidence grades allocated to these tables.

Very large positive and negative programme adjustments in the Q&S3a programme, principally affecting drinking water quality and water non-infrastructure capital maintenance, however significantly skew the allocation of costs between programme areas and drivers for 2009-10 and post 2009-10 expenditure.

Comments by Line

Lines 1: Base operational expenditure for 2009-10 is calculated as the total operating expenditure for the year less the additional operational expenditure in the report year.

The Company has not estimated base operating expenditure for future years and the figures shown in Lines G1.22 and G2.22 for future years are the sum of forecast opex impacts only.

Lines 15 and 16: No grants have been received or are forecast.

Lines 17: In addition to the infrastructure charge, these lines include other infrastructure contributions, such as those arising from NRSWA pipe relocations.

Lines 19: Contributions are those received and accounted for in the report year. No grants have been received or are forecast. The Company has not estimated grants and contributions for future years, owing to the uncertainty surrounding whether they will actually be received.

Lines 20: These lines were not audited for AR10.

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. We believe that a grade of B3 is more appropriate, in conformity with our suggested confidence grades for Tables G3a, G3b, G4a and G4b.

The principal uncertainty relates to the accuracy of proportional allocation. The original equal allocation of expenditure between drivers on individual Q&S2 projects has not been revisited for all projects and in some cases proportional allocation has not been revisited at later Capex stages, despite changes to project content. Risks also remain to the progress of the few individual projects remaining to be completed.

Confidence in the allocation of costs to drivers is more robust for Q&S3a project, 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. However in our opinion accuracy for Q&S3a projects remains within band 3.

8.3 Tables G3a & G3b – Q&S2 Delivery

Commentary by REPORTER

Introduction

Key Points

- We have checked the manipulation of capex costs and output data to compare Table G5 with Tables G3a and G3b by driver. We have checked the derivation of every line in Tables G3a and G3b from CIMS base data.
- We have concluded that the data in Tables G3a and G3b have been correctly processed and are consistent with data in Table G5 and CIMS by capital cost, year and driver.
- Proportional allocation of costs to drivers is less robust for Q&S2 projects than for Q&S3a projects. Not all Q&S2 projects have had proportional allocation revisited to realign allocations to drivers with the actual cost of meeting that driver. For both of the Q&S2 projects audited in detail for AR10 we found that proportional allocation had not been revisited at later Capex stages, despite changes to project content. Confidence in allocation of costs to drivers is lower for Tables G3a and G3b than for Tables G4a and G4b. We continue to recommend that all Q&S2 projects have proportional allocation reviewed following completion, except those having a single capital maintenance driver. In our opinion a confidence grade of B3 would be more appropriate than the B2 allocated by Scottish Water.

Audit Process

Tables G3a and G3b summarise the delivery of outputs detailed in projects contained in Table G5. For this section of the audit we checked and confirmed the manipulation of capex costs and output data and compared and reconciled Table G5 with Tables G3a and G3b by driver. We also used Business Objects to take an extract from CIMS base data and check the derivation of every line in Tables G3a and G3b.

Methodology

To prepare Tables G3a and G3b, Scottish Water takes an extract of CIMS data. These are the same data as are used to compile Table G5, but Table G5 is not used directly. The extract shows capital expenditure, phased over the relevant years, drivers and the percentage of cost to each driver. The extract is used to compile costs for each driver year by year for the lines of the tables. Scottish Water does not carry out specific audit checks on this process, but the process is considered to check itself if costs reconcile with Table G5 and Tables G1 and G2.

Conclusions

Compatibility of Tables G3a and G3b Capex with Table G5

Tables G3a and G3b summarise the investment reported at project level in Table G5 by quality driver. They are produced by summing the base data in CIMS which is also used to produce Table G5 and are in turn summarised to produce the Q&S2 information in

Tables G1 and G2. Tables G1, G2, G3a and G3b do not include the reported expenditure on the Q&S2 programme prior to 2006-07.

The total capital expenditure in Tables G3a and G3b is compared below to that allocated in Table G5:

Comparison of Tables G3a and G3b Capex with Table G5 (£m)

	2006-07	2007-08	2008-09	2009-10	Post 2010-09
Table G3a (Water)	77.004	22.338	1.944	3.606	1.195
Table G3b (Wastewater)	96.071	42.141	23.086	44.934	45.061
Table G3a + G3b	173.075	64.479	25.030	48.540	46.256
Table G5	173.075	64.479	25.030	48.540	46.256
Difference (G5-(G3a+G3b))	0.000	0.000	0.000	0.000	0.000

From the analysis, we are satisfied that total Q&S2 capex in Tables G3a and G3b is compatible with Table G5.

Allocation by Driver

From our checks on CIMS base data we were able to reproduce every line and yearly total in Tables G3a and G3b. We are therefore satisfied that Tables G3a and G3b are compatible with CIMS base data and Table G5 for every year and driver listed.

We have commented on the allocation of Capex by output measures in our commentary on Table G5. The allocation of costs to drivers is less robust for Q&S2 projects than for Q&S3a projects. For Q&S2 projects the initial allocation of cost was made equally to all drivers, irrespective of the actual cost of meeting each driver. Many, but not all Q&S2 projects subsequently had proportional allocation revisited to realign allocations to drivers with the cost of meeting that driver.

In our limited audit of Q&S2 projects for AR10 we found that for both projects audited proportional allocation had not been revisited at later capex stages, despite changes to project content. Confidence in allocation of costs to drivers is therefore lower for Tables G3a and G3b than for Tables G4a and G4b. We continue to recommend that all Q&S2 projects have proportional allocation reviewed following completion, except those having a single capital maintenance driver.

Summary

Overall we have concluded that the data in Tables G3a and G3b have been correctly processed and are consistent with data in Table G5 and CIMS by capital cost, year and driver.

Comments by Line

Our comments above apply to all lines in the table.

Comments by Confidence Grade

Scottish Water generally reports a confidence grade of B2 for capital expenditure estimates by individual quality drivers for the report year and for future years except for zero entries, where A1 is reported. The original equal allocation of expenditure between drivers on individual projects has been revisited on many Q&S2 projects, but by no means all. This was illustrated in our detailed project audits where proportional allocation had not been revisited at later Capex stages, despite changes to project content. Risks also remain to the progress of the few individual projects remaining to be completed. We therefore suggest a B3 confidence grade, except for non-zero entries.

8.4 Tables G4a & G4b – Q&S3 Drivers

Commentary by REPORTER

Introduction

Key Points

- We have checked the manipulation of capex costs and output data to compare Table G6 with Tables G4a and G4b by driver. We have checked the derivation of every line in Tables G4a and G4b from CIMS base data.

- We have concluded that the data in Tables G4a and G4b have been correctly processed and are consistent with data in Table G6 and CIMS by capital cost, year and driver.

Proportional allocation of costs to outputs is robust and has generally been correctly carried out.

Very large positive and negative programme adjustments in the Q&S3a programme, principally affecting drinking water quality and water non-infrastructure capital maintenance, significantly skew the allocation of costs between investment drivers for 2009-10 and post 2009-10 expenditure. This issue is discussed in our commentary on Table G6.

Audit Process

Tables G4a and G4b summarise the delivery of outputs detailed in projects contained in Table G6. For this section of the audit we checked and confirmed the manipulation of capex costs and output data and compared and reconciled Table G6 with Tables G4a and G4b by driver. We also used Business Objects to take an extract from CIMS base data and check the derivation of every line in Tables G4a and G4b.

Methodology

To prepare Tables G4a and G4b, Scottish Water takes an extract of CIMS data. These are the same data as are used to compile Table G6, but Table G6 is not used directly. The extract shows capital expenditure phased over the relevant years, drivers and the percentage of cost to each driver. The extract is used to compile costs for each driver year by year for the lines of the tables. Scottish Water does not carry out specific audit checks on this process, but the process is considered to check itself if costs reconcile with Table G6 and Tables G1 and G2. Capex and opex implications for new obligations are added separately, being calculated as described in our commentary on Tables G1 and G2, although very few projects are involved.

Conclusions

Compatibility of Tables G4a and G4b Capex with Table G6

Tables G4a and G4b summarise the investment reported at project level in Table G6 by quality driver. They are produced by summing the base data in CIMS which is also used to produce Table G6 and are in turn summarised to produce the Q&S3a information in Tables G1 and G2.

The total capital expenditure in Tables G4a and G4b is compared below to that allocated in Table G6:

Comparison of Tables G4a and G4b Capex with Table G6 (£m)

	2006-07	2007-08	2008-09	2009-10	Post 2010/09
Table G4a (Water)	128.365	329.599	406.343	375.689	76.736
Table G4b (Wastewater)	111.845	230.846	254.922	187.049	113.459
Table G4a + G4b	240.210	560.445	661.265	562.738	109.195
Table G6	240.211	560.445	661.265	562.737	190.194
Difference (G6-(G4a+G4b))	0.001	0.000	0.000	-0.001	-0.001

The slight differences in are due to rounding error. From the analysis, we are satisfied that total Q&S3a capex in Tables G4a and G4b is compatible with Table G6.

Allocation by Driver

From our checks on CIMS base data we were able to reproduce every line and yearly total in Tables G4a and G4b. We are therefore satisfied that Tables G4a and G4b are compatible with CIMS base data and Table G6 for every year and driver listed.

We have commented on the allocation of Capex by output measures in our commentary on Table G6, where we concluded that proportional allocation of costs to outputs is robust and has generally been correctly carried out. The allocation of costs to drivers is more robust for Q&S3a 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.

Programme Adjustments

The Q&S3a programme contains two projects which result in a significant skewing effect on the allocation of costs to drivers in Table G4a. These are project 40032 - Cap Maintenance Overhang Removals and project 36660 - SW Risk Contingency – SWS Programme, but with very large positive and negative cost allocations, including allocations of +235% to drinking water quality and –135% to water non-infrastructure. We have commented further on these allowances in our commentary on Table G6. These adjustments are confusing and result in a skewed picture of where expenditure has actually been made in Scottish Water's investment programme

Summary

Overall we have concluded that the data in Tables G4a and G4b have been correctly processed and are consistent with data in Table G6 and CIMS by capital cost, year and driver.

Comments by Line

Lines1 – 44 and 47: Our comments above apply to all of these lines.

Line 2: The large negative value for post 2009-10 expenditure in this line is due to the presence of project 40032 - Cap Maintenance Overhang Removals. Further discussion is given in our commentary on Table G6.

Line 3: The large negative value for 2009-10 expenditure in this line is due to the presence of project 36660 - SW Risk Contingency – SWS Programme, but with an allocation of –135% to water non-infrastructure. Further discussion is given in our commentary on Table G6.

Lines 45 – 46: For comments on new obligations see our commentary on Tables G1 and G2. New obligations were not audited this year.

Comments by Confidence Grade

The Company generally reports a B3 confidence grade for expenditure by individual quality drivers, except for zero entries, where A1 is reported. This is supported. For 2009-10 and previous years capital expenditure is now known with some certainty and the principal uncertainty relates to the accuracy of proportional allocation. For future years, some uncertainty attaches to the detailed development and progress of the schemes remaining to be completed.

Confidence in the allocation of costs to drivers is more robust for Q&S3a 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. However in our opinion accuracy for Tables G4a and G4b remains within band 3.

8.5 Table G5 – Q&S2 Project Analysis – Actual and Forecast

Commentary by REPORTER

8.5.1 Introduction

Key Points

We have reviewed the methodology for compiling Table G5 and compared Table G5 with CIR Q4. Comparison with the WIC18 programme was not required this year. We have audited two projects selected from Table G5 because they showed significant expenditure post 2009-10 to confirm the validity of capex costs, opex costs, outputs, proportional allocation and the treatment of risk**.**

Table G5 covers the Q&S2 programme, which is virtually complete. Only 14 Q&S2 projects are unfinished, with a total estimated cost of £79m, including £46m post 2009-10. Virtually all of the overhang is concentrated in four projects which are currently being constructed, including 1243 - Dunoon Sewerage Scheme with post 2009-10 expenditure of £29m.

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.

Table G5 is compiled from CIMS. Table G5 has been fully reconciled with the Capital Investment Report for 31st March 2010, with the exception of contributions. These were not updated for CIR Q4 due to time constraints but were updated for Table G5, based on the latest information from Finance at that time. d.

Prior to last year, Table G5 recorded a negative adjustment of the SWS share account to reflect the current assessment of the outcome of the Q&S2 programme. This year Table G5 does not include for any risk adjustment. An element of project 40020 that appears in table G6 for risk allowance relates to the Q&S2 programme. Further information on project 40020 can be found in our narrative in Table G6.

From our individual project audits we have concluded that:

a. Information in Table G5 on estimated outturn cost coincided with CIR Q4, but not exactly with the project manager's latest best estimate (LBE)

b. Capex 5 dates given in Table G5 were consistent with the project manager's latest best estimate of Beneficial Use date.

c. Opex impacts were understated, compared with the project manager's latest best estimate: in one case because these had not been revisited following changes in project content and in another because an opex impact of +£411,000 had been omitted in error.

d. Proportional allocation of costs to outputs had been carried out in accordance with agreed guidelines, but not revisited at later capex stages following development of the projects.

- The data given in Table G5 are a fair and representative picture of the programme as it stood at 31st March 2010 and are valid and sufficiently accurate for the purposes of the other G Tables.
- Estimates of post 2009-10 (overhang) expenditure for Q&S2 projects are reasonable, being based mainly on contract costs for projects being constructed. Opex impacts may be understated and capital allocation had not been revisited at later project stages following development of the projects audited.
- As requested by WICS we have included at the end of our commentary on Table G5 a section on capital allocation to asset types. We concluded that a system exists whereby all expenditure on projects that have reached Capex 5 can be accurately allocated to functional areas and detailed assets, including water meters and communication pipes. Projects that have not yet reached Capex 3 (or Capex 5 for Q&S2 projects) are not currently allocated. However there appears to be no reason why Scottish Water could not implement a simplified allocation method for projects at these stages. Given that pre-Capex 3 projects are not yet fully defined the allocation would, inevitably, be less accurate even if the requirement was for the completion of the full CAF.
- Our sample of individual projects was too small to draw reliable conclusions, but there are indications that CAF forms may not always be accurately completed, which would affect the reliability of allocation of capital costs to functional areas.

Audit Process

Table G5 contains detailed project information relating to Q&S2 projects and the Reporting Requirements require the Reporter to check its validity. In this section of the audit we:

Reviewed the methodology for the completion of Table G5

Compared and reconciled Table G5 with the Capital Investment Report for the quarter ending 31st March 2010 (CIR Q4)

By programme analysis, interviews with the relevant Scottish Water staff and the analysis of base data, reviewed programme issues including:

Project approval status and overhang into the Q&S3b investment period

The treatment of risk reserves, programme adjustments and the SWS share allocation.

Carried out audits of a range of projects selected from Table G5, interviewing the project managers and reviewing project documentation to confirm the validity of capex costs, opex costs, outputs and proportional allocation and review the treatment of risk

8.5.2 Methodology

Table G5 reports expenditure on the completion of the Q&S2 programme and outputs only. 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 project reports in Table G5 is Scottish Water's Capital Investment Management System (CIMS). This includes:

- Actual expenditure information. Expenditure is imported into CIMS on a daily basis from the Project Ledgers.
- Future expenditure profiles. These 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 taken from Scottish Water's Capex approvals system.
- Actual or forecast milestones dates, particularly the Capex approval dates, which are taken from the Scottish Water capital approvals system.
- The above information is summarised into the quarterly Capital Investment Report (CIR). CIR for the quarter ending 31st March 2010 (CIR Q4) was used as the basis of Table G5.

8.5.3 Conclusions – Programme Level

Our conclusions on individual issues are incorporated into the following sections.

Comparisons with Other Submissions

Compatibility with the Capital Investment Report - Quarter 4.

CIR Q4 is divided into completion of the Q&S2 programme and the Q&S3a programme. A comparison of the totals for the Q&S2 programme with Table G5 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	64.480	25.030	48.540	46.256
CIR expenditure profile	173.075	64.479	25.030	48.540	46.256
Difference CIR – Table G5	0.000	-0.001	0.000	0.000	0.000

Projected overhang includes no risk allowances as the previous risk allowances have now been allocated entirely to individual projects. One project was found in Table G5 (12063 - Q&S2 Infra Customer Contribution) which does not appear in CIR Q4. This project shows no expenditure but contains the sum of contributions received against both infrastructure and non-infrastructure projects. It therefore does not affect the reconciliation shown in the table above and we are satisfied that Table G5 is compatible with CIR Q4 for capital cost. Small differences in totals are due to rounding,

However the total of contributions in Table G5 is £19.577m, whereas the total in CIR Q4 is £20.010m. This discrepancy arose because contributions had not been finalised at the time of production of CIR Q4 in early April. Contributions were however updated for Table G5 with the latest view from Finance at that time. It is not possible to reconcile the total of contributions in Table G5 with Tables G1 and G2 because contributions included in Table G5 may fall outside the Q&S2 investment period.

Consistency of Table G5 with the WIC 18 Programme

This comparison was not required for AR10

Programme Issues

Allocation by Project Driver

Checks on the allocation of costs to project drivers were made during the audit of the Q&S2 projects listed below. These concluded that allocation had been revisited in line with Q&S3a practice, but that following development of the projects this had not been amended accordingly at later capex stages.

Q&S2 Project Approval Status and Overhang

We have reviewed the approval progress for Q&S2 projects in Table G5 at 31st March 2010. Excluding stopped and deferred projects and programme adjustments only two projects, with a total estimated cost of £2.026m, had not reached Capex 3 approval. A further 12 projects with a total estimated cost of £77.134m were in construction. All of the remaining projects were at Capex 5 or beyond.

Scottish Water is projecting post-2009-10 expenditure on Q&S2 projects at £46.256m. Virtually all of this expenditure is contained in just four projects, including 1243 - Dunoon Sewerage Scheme which has post 2009-10 expenditure of £26.861m.

Risk Reserves, Programme Adjustments and SWS Share Account

Prior to last year, Table G5 recorded a negative adjustment of the SWS share account to reflect current assessment of the outcome of the Q&S2 programme. This year Table G5 does not include for any risk adjustment. An element of project 40020 that appears in table G6 for risk allowance relates to the Q&S2 programme. Further information on project 40020 can be found in our narrative in Table G6.

8.5.4 Checks on the Validity of Data in Table G5 - Q&S2 Projects

The Reporting Requirements ask the Reporter to undertake audits of a range of projects to check the validity of data in Table G5 and G6. Given the small number of Q&S2 projects now remaining to be completed we have audited only two Q&S2 projects. Both have significant continuing costs after March 2010. Our findings are summarised below. From this small sample audit we have concluded that reasonable estimates have been made of total capital cost for the completion of the projects concerned, although the Table G5 figures did not correspond exactly with the project manager's latest best estimate.

Two out of three opex impacts were understated, compared with the project manager's latest best estimate: in one case because these had not been revisited following changes in project content and in one case because opex impact had been omitted in error. The Table G5 estimate of completion date was found to be consistent with the project manager's latest best estimate.

Key Points from Investment Project Audits

A sample of projects was audited to check the validity of data in Table G5.

Information in Table G5 corresponded to the Quarterly Investment Report for the end of year 2009/10 (CIR Q4).

Information in CIR Q4 and Table G5 on estimated outturn cost and completion date in general corresponded to the project manager's latest best estimate (LBE), although often with small differences, particularly in total capex cost.

The Opex impact stated in Table G5 corresponded to the most recent Capex submission. This is because Opex impact is only revisited for Capex submissions. In two cases the opex impact in Table G5 differed from the project manager's latest best estimate. In one of these an opex impact of +£411000 had been omitted in error.

Proportional allocation of costs to outputs had, with only minor exceptions, been carried out in accordance with agreed guidelines, but for both of the Q&S2 projects audited had not been revisited at later capex stages following development of the project.

During our audits we continued to note that the focus of SWS staff involved in projects remained on contract cost, rather than overall project cost. We found some examples where significant external risk factors (such as the need to agree consents or reach agreements with third parties), which could affect project completion dates, were not included in project risk registers, which focus on costed risks. We continue to recommend that project risk registers should be reviewed to ensure that they contain all risks, including those borne by Scottish Water, particularly where these could affect the completion date, but do not affect outturn cost.

We have concluded that the data given in Table G5 are a fair and representative picture of the programme as it stood at 31st March 2010 and are valid and sufficiently accurate for the purposes of the other G Tables. Estimates of post 2009-10 (overhang) expenditure for these Q&S2 projects are reasonable, being based on forecast costs for projects in construction.

Audit Process

The Reporting Requirements require the Reporter to check the validity of the data in Tables G5 and G6 for a variety of project sizes and types. In order to do this, a sample of 14 projects was audited, comprising 2 Q&S2 projects and 12 Q&S3a projects. The purpose of these investment project audits was to check on project capex and opex estimates, the project programme, drivers, risks and outputs and comment on their reliability. For each project the project manager was interviewed and project documentation was examined. Documentation reviewed included capex approval forms and supporting information, project risk registers, engineering drawings and specifications.

For each project the capex and opex estimates and programme dates contained in Table G5 were compared with:

- Information contained in Scottish Water's Capital Investment Report for the period ending March 2010 (CIR Q4)
- Capex approval paperwork
- The project manager's latest best estimate (LBE).

The allocation of drivers was checked and where the project had more than one driver, the proportional allocation of costs to drivers was checked. Risk registers were examined to determine factors relevant to the completion of the project by the forecast date.

All projects have been developed by Scottish Water or Scottish Water Solutions within the context of its capex reporting mechanisms and approval procedures. Information provided by SWS in capex submissions is checked and approved through the capex approvals procedure. Scottish Water also review project data in the preparation of each quarterly Capital Investment Report (CIR). Information input direct to CIMS by SWS by means of uploads from P6 remains briefly unchecked by Scottish Water until it reaches either a Capex submission or review for the CIR report.

Investment Project Audits

The projects audited and our conclusions upon them are given below. Two Q&S2 projects were audited, both showing significant costs continuing beyond 31st March 2010:

<u>12037 Newton Stewart WWTP and PS – Remedial and Strategic Growth Upgrade and 35750 Newton Stewart Mortons Entry CSOs and Minnigaff Growth</u>

The whole scope of work in these projects was originally covered by the Q&S2 project no 12037 but has now been split as noted above to allow progress to be made with CSOs pending the resolution of delays to the remainder of the works. Q&S3a project 35750 has been included here for completeness. The scope of the work in the two projects is:

- 12037 (Q&S2) – an upgrade to Newton Stewart WWTP and improvements to cater for growth in the Minnigaff area.
- 35750 (Q&S3a) – improvements to two CSOs at Mortons Entry and the diversion of flows by pumping to the WWTP.

Outputs for the two projects have been allocated to SG1 – Sewerage Growth (33%) and EC01 Wastewater Quality (67%). These figures are based on the assessment made for project 12037, where the cost of the project without growth was allocated to EC01 and the marginal cost for growth to SG1. This was correct in principle for that project, but capital allocation has not been revisited following the separation of the work elements into two projects and proportional allocations for the two current projects will be different, with much of the growth covered in project 12037.

Project 35750 is complete on site and Beneficial Use has been achieved. CIR Q4 and Table G6 both show the total estimated capex at £4.622m, similar to the project manager's LBE of £4.614m.

The latest best estimate of opex is unchanged from the figure given in the Capex 3 submission at +£27,000 p.a. However Table G6 shows an opex impact of +£15,000 p.a.

Project 12037 consists of two parts. The first part is the provision of additional storage at Newton Stewart pumping station, using a redundant storm tank, and the fitting of new screens. Growth is catered for by the diversion of part of the catchment previously draining to Mortons Entry. This work is complete and the diversion of flows is imminent. The second part of the work is the extension of the Newton Stewart WWTP by the provision of a new parallel treatment stream. Work on the WWTP has begun on site.

The project has been subject to significant delay due to the change from a framework contract to a competitive tender to achieve better value for money, followed by a change in the proposed solution from a bio-filter to an oxidation ditch.

The risk register was examined. Running sand is expected in excavations, but the contractor bears all risks connected with ground activities. Scottish Water bears the risk of delay to the achievement of the regulatory date, but no cost has been included in the risk register to cover this. The project estimate includes a risk cost of £506,000.

Table G5 and CIR Q4 both show a total capital cost of £6.775m and a post-2009/10 (overhang) cost of £3.926m. This compares with the project manager's LBE of £6.586m and £3.926m respectively. These figures are consistent with the proposed construction programme.

Opex costs were calculated from the Opex Model. Table G5 shows an opex impact of +£73,000 p.a. based on the Capex 4 estimate. This was however based on the previous proposal of a biofilter and should be revisited for the oxidation ditch now proposed.

Table G5 shows a forecast Capex 5 date of November 2010. The project manager's LBE for Capex 5 approval is December 2010, while CIR Q4 shows Beneficial Use in October 2010. Given the likely delay in achieving Capex 5 after Beneficial Use, these dates are slightly inconsistent.

We concluded that capital allocation for the project has not been revisited following changes to the project content. The total capex cost in Table G5 is overstated, compared with the project manager's LBE, although overhang is correctly stated. Opex costs in Table G5 do not reflect the current project. Table G5 dates are broadly consistent with the latest best estimate.

<u>12065 Campbeltown – Quality Phase 2 WPS</u>

Campbeltown is a Q&S2 project which has been subject to significant delays and cost increases, exacerbated by vociferous and effective local protest. All of Cambeltown's sewage drains to the Kinloch Park pumping station which lies in a very conspicuous location on the seafront and has experienced frequent overflows to Campbeltown Harbour. Flows are pumped onward from Kinloch to the Slaty Farlan WTW for treatment. Previous work packages have improved the sewer network, extended the pumping station outfall, provided an under-sea storm rising main from the pumping station to the WWTW and removed capacity bottlenecks at the WWTW.

The current project includes the final sewer improvements, improvements at the Kinloch Park pumping station and further extensions at the WWTW including additional storage and treatment capacity, disc filters, ultraviolet treatment and storm tanks. These works will allow normal flows to be pumped through existing sewers along the shoreline and storm flows to be pumped under the loch for treatment and restrict spills from the pumping station to 5 per summer season.

Capital costs have been allocated in the following proportions: WW1 (sewage flooding) 5%, WQ3/1 (recreational waters) 35%, EC3/1 (Shellfish Directive) 60%. These allocations have been correctly made on the basis of the project manager's estimate of the actual cost of achieving each output. Tertiary and UV treatment are needed for the shellfish output but not for the recreational water output. This assessment was made at Capex 2 stage and was not revisited for the current Capex 3 approval.

The risk register for the project was examined. Necessary land has been bought and planning permission obtained, although some minor landscaping improvements will require amended permission. The main remaining risks are connected with construction and with the operation of a complex two-stream WWTW. The project cost includes a risk cost of £0.948m.

The project manager's LBE of total project cost is £11.320m. CIR Q4 and Table G5 show a total cost of £11.927m, with £9.730m post-2009/10.

The project manager's LBE of opex cost is +£411,000 p.a. This is the cost calculated at Capex 3 stage using the opex model. This was examined and seen to be based on a detailed design. The major elements of the increase in opex costs are sludge tankering (as all sludge has to be tankered to Glasgow), maintenance and power. Opex costs have been omitted from Table G5, which shows an opex impact of zero.

The project manager's LBE for the Beneficial Use date is December 2011. CIR Q4 shows a BU date of August 2012, which is inconsistent with the Table G5 Capex 5 date of July 2012.

We concluded that total capital cost in Table G5 is overstated, compared with the project manager's LBE and that significant opex costs have been omitted from Table G5. The forecast Capex 5 date is however consistent with the project manager's LBE. Proportional allocation of costs has been correctly carried out but has not been revisited to correspond with the current project and costs.

A summary of project costs and completion dates is given below:

Project (summary titles)	Total capex £m		Opex impact £000 p.a.		Completion date	
	LBE	Table G5/G6	LBE	Table G5/G6	LBE for BU	Table G5/G6 Capex5
12037 Newton Stewart WWTP and PS	4.614	4.622	27	15	BU already reached	May 2010
35750 Newton Stewart Mortons Entry and Growth	6.586	6.775	73	73	Oct 2010	Nov 2010
12065 Campbelltown Quality Phase 2	11.320	11.927	411	0	Dec 2011	July 2012

Conclusions from Investment Project Audits

From this small sample audit we concluded that total capex for the projects audited corresponded exactly with the figures in CIR Q4, although not with the project manager's latest best estimate. Opex impacts were understated, compared with the project manager's latest best estimate, in one case because these had not been revisited following changes in project content and in another because an opex impact of +£411000 had been omitted in error.

We also concluded that the Capex 5 date given in Table G5 or G6 was consistent with the project manager's latest best estimate of Beneficial Use date and that proportional allocation of costs to outputs had, with only minor exceptions, been carried out in accordance with agreed guidelines, but not revisited at later capex stages following development of the projects audited.

From our investment project audits we concluded that the data given in Table G5 are on the whole a fair and representative picture of the programme as it stood at 31st March 2010 and are valid and sufficiently accurate for the purposes of the other G Tables. Estimates of post 2009-10 (overhang) expenditure for these Q&S3a projects are reasonable, given that construction is now taking place. Opex impacts may be understated and capital allocation had not been revisited at later project stages following development of the projects.

8.5.5 Comments by Line

These are not appropriate for Table G5.

8.5.6 Comments by Confidence Grade

Confidence grades are not allocated to Table G5.

8.5.7 Capital Allocation to Asset Types and Programme Groupings

We have been requested by WICS to assess Scottish Water's procedures for allocating both capex and opex to assets, programme groupings and hence to the functional areas of water resources, raw water conveyance, water treatment, distribution, collection and wastewater and sludge treatment. In this section we discuss Scottish Water's method of allocating capex.

The allocation of opex to functional areas is discussed in Section 7.1

Current Methodology

Scottish Water processes its projects through a series of Capital Expenditure Approval points where decisions are made or budgets are released. Briefly these are:

Approval Point	Description[DA1]
CAPEX 1	Feasibility - Approval for a study
CAPEX 2	Development - Preferred option identified
CAPEX 3	Implementation - Preliminary design complete and target cost agreed
CAPEX 4	Change Control > than 10% of budget identified[SW2] (projects less that £1m.) 5% of budget for projects over £1m. – change of scope – change to project milestones
CAPEX 5	Handover- asset commissioned Formal acceptance by Scottish Water and regulators Beneficial use
CAPEX 6	Close out – project financials and defects resolved and closed.

Financial information on projects is recorded in Scottish Water's programme management system, CIMS. This is shortly to be upgraded to a new, but similar, system called CISP. Within CIMS projects are allocated to programme groupings such as water resources, but only as an indicator of the overall project area, rather than an accurate proportional allocation.

Project managers are required to complete a Capital Analysis Form (CAF) to allow accurate allocation of estimated Capex costs to assets. This is used by Scottish Water to claim capital allowances. For Q&S3a projects CAF completion is required when the project reaches Capex 3 and when the project reaches Capex 5 the CAF form is updated with actual costs. For Q&S2 projects the CAF is only required when the project reaches Capex 5.

The prime purpose of the CAF form is to allow an accurate allocation of costs to assets of different lives, which are recorded on the fixed asset register and form the basis of Scottish Water's depreciation calculations. In previous audits we examined the structure of the form and we confirm that the proscribed asset type definitions and allocated lives to asset categories are consistent with Scottish Water's financial rules. The CAF analysis is clear and comprehensive and we believe that it could provide good quality information for Scottish Water to accurately allocate costs to assets, programme groupings and functional areas, where the form exists. Below we give further information on the CAF form:

- The form comprises three Excel spreadsheets: one for water, one for wastewater and one for support services.
- The project is allocated to a cost centre allowing costs to be allocated to a geographical area.

- Within the relevant spreadsheet costs are allocated to a hierarchy of asset categories:
    - Network function (e.g. Raw water facilities, raw water pipework, raw water pumping station)
        - Profile ID (e.g. land, fencing, telemetry, water mains etc)
            - FERC code (e.g. infrastructure assets only: distribution main, communication pipe)
- The CAF form is completed by the project manager.
- The Finance department carries out training of project managers in the importance of accurately completing the form.
- CAF forms are audited:
    - Scottish Water's finance department checks about 75 forms per year out of a total of around 1750 per year (4% sample).
    - Internal financial auditors check around 100 forms per year (6% sample)
    - Her Majesty's Inspectors of Income and Taxes (HMIE) carry out further checks.

While we believe that the CAF form allows a robust allocation of capital expenditure to functional areas where it has been properly completed, in any year there will be some expenditure against projects that have not yet reached Capex 3 (for Q&S3a) or Capex 5 (for Q&S2) and hence will not have a CAF. Currently expenditure in this category is not allocated to any functional area and, even if done, accuracy would be low as the project is still developing. However, having said this, it is likely that many projects will be single function and able to be allocated very simply.

There is no de-minimus limit for when a CAF must be produced. If there is any capital investment at all, then Scottish Water's business rules require that it must be analysed on a CAF. Historically, minor variations on this rule related to situations such as a single CAF being produced for a number of capital projects with similar outputs but where the overall value was relatively small, circa £5k -£10k. In such situations Finance approval was required and a separate schedule was produced and attached to the CAF showing the individual value of each project which was included within the overall total of the CAF. Regardless of the value however, the investment value was analysed on the CAF.

We understand that when CISP Phase 2 is implemented, all projects will be required to have individual CAFs produced at Capex 3, 4, 5, 6 regardless of value. It will be a requirement that both capex forms and CAF documents are produced and that their values are matched and verified before being allowed to progress through the approval stage.

Review of CAF Forms for a Sample of Projects

As part of our audit we examined a number of CAF forms. The sample was necessarily of a small size as it was restricted to investment projects which we audited for either

AR09 or AR10 (and thus had an understanding of project content) and because not all of those projects had reached a stage where the rules require the production of a CAF.

Among the eight projects where CAF forms were checked we found:

- Three single-function projects where costs had been correctly allocated to that functional area.
- One project including new boreholes, water treatment, distribution mains and a service reservoir where no cost had been allocated to water resources and the cost of the service reservoir had been incorrectly allocated to water treatment instead of distribution.
- One NRSWA project involving both mains and sewer diversions where costs had been allocated 63%/37% to water mains and sewers on the CAF and 50%/50% to water and wastewater capital maintenance drivers.
- One sewerage and wastewater treatment project where the entire project cost had been allocated as a lump sum to wastewater treatment with no breakdown and no cost to sewerage. This project is approaching Capex 5 when we would expect the CAF form to be revised.
- One project for CSO improvement and sewage pumping where costs had been partly allocated to sewerage, but mainly to wastewater treatment. The CAF form appeared to relate to a superseded project scope and we would expect the CAF to be revisited when the project reaches Capex 5 in the next couple of months.
- One project for sewerage, sewage pumping, CSOs, wastewater treatment and a sea outfall where costs had generally been correctly allocated, except that no cost was allocated to the outfall. Scottish Water has confirmed that there is an error in the CAF which will be revised.

From this small sample we have some reservations about the accuracy of allocation to functional areas. The information on the form did not always accurately reflect of the scope of the project and the assets created. Despite Scottish Water's audit process it does appear that errors are possible and we suggest that Scottish Water reviews its procedures to ensure accurate completion of CAF forms.

Consistency of approach compared to OPEX allocation

We have covered the allocation of opex costs in detail in Section E. Here we summarise the system used and compare it to the allocation of Capex above.

Operating costs are allocated to assets and to activities within the Company's ABM system. The Ellipse system captures work undertaken using work orders and records it against an asset and an activity; time, travel and materials are captured in this way. These costs are then interfaced to Peoplesoft, Scottish Water's primary financial and procurement system. Peoplesoft supports accounting separation by the provision of a costing analysis by team, asset, zone, project, service and job. Information from Peoplesoft is fed directly into Metify.

Metify, the company's ABC system is structured around Scottish Water's key activities having over 250 separate activity codes which are grouped to give the split for business units required for accounting separation and the Annual Return E&M tables. Where activity analysis is already undertaken (e.g. from work orders) these are directly captured into Metify. The system then uses a series of drivers to allocate costs from the general ledger to activities. This is a very complex system and has various checks and flags that mean costs can only be allocated once to avoid double counting and that non core and core activities are separated. This gives a comprehensive allocation to the various service areas required for accounting separation. This methodology has now been in use for a number of years and the key drivers are well established needing little review on an annual basis.

Typically around 85% of costs are directly allocated in this way. Draft schedules are then produced where local managers and accountants review the costs in the schedules and complete the allocation for the remaining costs. We have examined these schedules for two operational areas in detail and confirm that from the sample tracked through activities and the GL these costs have been allocated in a consistent and reasonable manner.

There are a few areas where costs are allocated to an asset which crosses the boundary between business units. An example would be the power cost for a wastewater treatment works and sludge treatment centre on the same site. The ABM system can only allocate such costs to one asset and further splits need to be undertaken and reallocated by local managers. This area is less consistent in approach, but in the absence of sub-metering cannot be avoided. A defined methodology and clear guidance given to managers would improve this allocation further. The split of power costs for treated water distribution pumping is based on volumes, KW rating of pumps and hours run and is applied on a consistent basis.

The ABM methodology used for operating costs allocates costs by asset and by activity, whereas the capital expenditure is allocated by asset. We believe that the hierarchy of assets would be similar for both opex and capex.

Conclusion

We concluded that a system exists whereby all expenditure on projects that have reached Capex 5 can be accurately allocated to functional areas and detailed assets, including water meters and communication pipes. Projects that have not yet reached Capex 3 (or Capex 5 for Q&S2 projects) are not currently allocated. However there appears to be no reason why Scottish Water could not implement a simplified allocation method for projects at these stages. Given that pre-Capex 3 projects are not yet fully defined the allocation would, inevitably, be less accurate even if the requirement was for the completion of the full CAF.

Our sample of individual projects was too small to draw reliable conclusions, but there are indications that CAF forms may not always be accurately completed, which would affect the reliability of allocation of capital costs to functional areas.

8.6 Table G6 – Q&S3 Project Analysis – Actual and Forecast

Commentary by REPORTER

8.6.1 Introduction

Key Points

We have reviewed the methodology for compiling Table G6 and compared Table G6 with CIR Q4 and Table K56 of AR06. Comparison with the WIC18 programme was not required this year. We have audited a range of projects selected from Table G6 to confirm the validity of capex costs, opex costs, outputs, proportional allocation and the treatment of risk**.**

Table G6 covers the Q&S3a programme. In the report year investment has reduced slightly from the level of AR09, but remains at a high level with the Q&S3a programme approaching completion. Capital maintenance expenditure has reduced but there are continuing high levels of expenditure on quality projects, especially for drinking water and UID improvements.

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.

- Table G6 is compiled from CIMS. Table G6 has been fully reconciled with the Capital Investment Report for 31st March 2010. Table G6 has been reconciled with Table K56 of AR06 in terms of outputs.
- We have concluded that there is scope for a more comprehensive set of output codes and measures for capital maintenance.
- We have not been able to establish a clear approach to inflation in the various sub-programmes, in particular the calculation of spend in programme holding lines.
- Post 2009-10 expenditure on Q&S3a projects (overhang) is estimated as £192m. The bulk of overhang cost is concentrated in a comparatively small number of projects. These include in particular Glencorse New WTW, WTW upgrades where there have been difficulties in defining options and projects in the UID improvement programme. Q&S3a projects in Table G6 at the 31st March 2010 have a total estimated project cost of £2236m. 6% are at Capex 3 or before, with a total estimated project cost of £236m, 12% are in construction with a total estimated project cost of £737m, and 82% are at Capex 5 or beyond with a total estimated project cost of £1263m.

For this year all Scottish Water's risks, both for Q&S2 and Q&S3a, have been consolidated into a single project in the Q&S3a programme, totalling £21.0M (of which £19.0M is for Q&S3a and £2.0M is for Q&S2). This project is coded to 4 drivers. In addition to the risk allowance Scottish Water has a "liability register" to cover the commercial contract arrangements it has with SWS. This is held in a specific project code within CIMS. In total these two items are greater than the risks identified in the programme last year.

Last year we noted that Scottish Water now employs a risk analyst who develops the risk management project and the information within it based on formal risk registers. This is a more structured approach than we have seen in years prior to 2007/8 and we believe that it is a beneficial development.

- From our individual project audits we have concluded that:
    - Information in Table G6 on estimated outturn cost and completion date in general corresponded to the project manager's latest best estimate (LBE)
    - In most cases the Opex impact stated in Table G6 corresponded to the most recent Capex submission.
    - Proportional allocation of costs to outputs had, with only minor exceptions, been carried out in accordance with agreed guidelines and been revisited at each Capex stage

- The data given in Table G6 are a fair and representative picture of the programme as it stood at 31st March 2010 and are valid and sufficiently accurate for the purposes of the other G Tables. Estimates of post 2009-10 (overhang) expenditure for these Q&S3a projects are reasonable for the stages of development at which they currently stand.

Audit Process

Table G6 contains detailed project information relating to Q&S3a projects and the Reporting Requirements require the Reporter to check its validity. In this section of the audit we:

Reviewed the methodology for the completion of Table G6

Compared and reconciled Table G6 with the Capital Investment Report for the quarter ending 31st March 2010 (CIR Q4)

Compared and reconciled Table G6 with Table K56 from the Annual Return 2005-6

By programme analysis, interviews with the relevant Scottish Water staff and the analysis of base data, reviewed programme issues including:

Project approval status and overhang into the Q&S3b investment period

The treatment of risk reserves, programme adjustments and the SWS share allocation.

Carried out audits of a range of projects selected from Table G6, interviewing the project managers and reviewing project documentation to confirm the validity of capex costs, opex costs, outputs and proportional allocation and review the treatment of risk.

8.6.2 Methodology

Table G6 is compiled from CIMS and 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 and the methodology for compilation are as described for Table G5 above.

8.6.3 Conclusions – Programme Level

Our conclusions on individual issues are incorporated into the following sections.

Comparisons with Other Submissions

Compatibility with the CIR.

CIR Q4 has been divided into completion of the Q&S2 programme and the Q&S3a programme. A comparison of the totals for the Q&S3a programme with Table G6 is set out below:

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	560.445	661.265	562.737	190.194
CIR Q4 expenditure profile	240.211	560.445	661.265	562.737	190.194
Difference CIR – Table G6	0.000	0.000	0.000	0.000	0.000

For this year Scottish Water's risks for the Q&S3a programme have been consolidated into a single project no 40020 - Q&S3a Risk management holding code in Table G6, which at 31st March 2010 totalled £21.000m.

A count of project numbers shows that Table G6 contains a net 345 more lines than CIR Q4. This is due to the inclusion of zero-cost K Table projects which did not proceed in Table G6. CIR Q4 contains multiple lines for some projects to hold information about the staged delivery of outputs. Only the parent line holds the project cost. As a result of these differences the numbers of projects in Tables G6 and CIR Q4 are different but the expenditure and outputs are identical. We are satisfied that Table G6 is compatible with CIR Q4.

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:

Outputs Where Table G6 Delivery is Less Than the Table K56 Target

Output Code	Description	Units	Table K56	Table G6	Comments
CS2	Odour Management	Works	35	14	21 odour outputs are actually for Q&S3b. Three Table G6 Q&S3a will not now be delivered until the Q&S3b period.
EC12	IPPC Directive	No	61	5	Target reduced to 1 with the agreement of the regulator. Five outputs have been delivered.
WR5	Water Quality Licences	No	574	526	Target reduced to 521 with the agreement of the regulator. 526 actually delivered.
RDC	Remove Development Constraints	PE	120000 (50/50 split water/ sewerage)	0	Outputs transferred from RDC to SG1 and WG1
SG1	Growth – Sewerage	PE	0 (60000 implied)	76609	
WG1	Growth – Water	PE	0 (60000 implied)	186694	

In addition to the above comparison, the output lines for odour management, IPPC Directive and water quality licences were audited. In each case Scottish Water provided a list of the projects delivering the outputs and this was checked with the totals in the table above. Sample Capex forms were seen to verify the numbers of outputs claimed.

CS2 – Odour management. 14 outputs were programmed for delivery in the Q&S3a investment period, by agreement through the Scottish Odour Steering Group (SOSG). Scottish Water produced a list of the 14 sites and it was confirmed that work at 11 had been completed. The three remaining sites (Perth WWTW, Troqueer WWTW and Castle Douglas WWTW) will not be completed until the Q&S3b investment period. Project 36450 – Perth WWTW Odour Control – Phase 2 was audited. Our findings are given below in our commentary on checks on the validity of data in Table G6 and it was confirmed that this project had been delayed due to difficulties in determining effective odour control measures.

EC12 – IPPC Directive. After discussion with the regulator the required outputs were reduced to one. However five outputs have now been delivered by the completion of four projects. The list of projects was inspected and completion was confirmed.

WR5 – Water quality licences. The Table K56 target for water quality licences was 574 sites. Licences are issued by SEPA and project 32500 covered all of the work necessary to obtain these. Following a desktop exercise by Scottish Water the list of sites was discussed with SEPA who in 2007 accepted that 521 sources required licencing. The measures required at each site were also agreed. This was confirmed by inspection of SEPA's letter of agreement. A list of the 521 sources was seen and details for three sample sites were audited. Work at the 521 sites has been completed and sign-of of the work by SEPA in 2009 substantiated. In addition work has been delivered at five further sites.

From the above analysis it can be seen that in most cases the agreed Table K56 outputs have been delivered or exceeded. For outputs where the Table G6 outputs are lower than the Table K56 outputs the differences have been reconciled. We have therefore 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.

Consistency of Table G6 with the WIC 18 Programme

This comparison was not required for AR10

Output Codes

In the Annual Return Reporting Requirements, Guidance to the Reporter for Table G asks the Reporter to assess the use and breadth of the basket of output codes to establish whether there is scope for further improvement in output definition.

We have briefly reviewed the output measures and units available for Q&S3a projects. We have concluded that the range of output measures for quality, environmental, growth and customer services projects is sufficiently comprehensive. The range of output measures and units available for capital maintenance projects is however rather limited. Only five codes are available, with one each for water infrastructure and non-infrastructure and wastewater infrastructure and non-infrastructure, plus one for maintenance work.

In our view these do not draw a sufficient distinction between work carried out on different types of assets. For example, for water infrastructure the only code and measure available is WSI – kilometres of length of infrastructure relined/replaced. This measure is not relevant to water infrastructure assets other than pipes, such as dams and impounding reservoirs, raw water intakes and meters.

We recommend that a more comprehensive set of codes and measures should be developed for capital maintenance. This would have the benefit of providing a more comprehensive picture of the benefits of capital maintenance expenditure and generating useful information for asset management by Scottish Water. Scottish Water has developed such codes and measures in the preparation of the most recent Strategic Business Plan.

Programme Issues

Inflation

Table G6 and the CIR are both at project outturn prices. Up to Capex 3 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

Many projects have a single driver and 100% allocation is appropriate. For projects with more than one driver proportional allocation is required to the project drivers. In some cases, for example asset intelligence, property or health safety, the allocations are made as either a nominal 12.5% to each of the eight areas or 50% to two areas, depending on the type of work being undertaken.

Current practice follows Scottish Water's guidance note on capital expenditure allocation. 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, and this was found in practice to be the case during the audit of individual projects, with only minor exceptions. 32% of Q&S3a 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 sample of projects was reviewed to illustrate the application of the rules and gave an indication that costs had generally been correctly allocated to drivers, with costs being allocated to drivers in the proportion of the cost required to meet those drivers. All projects in Table G6 have at least one driver allocated.

Q&S3a Project Approval Status and Overhang

We have reviewed approval progress for Q&S3a projects in Table G6 at the 31st March 2010. 4280 projects are listed in Table G6 as proceeding (i.e. not stopped or deferred), with a total estimated project cost of £2236m. Of these 6% are at Capex 3 or before, with a total estimated project cost of £236m, 12% are in construction with a total estimated project cost of £737m, and 82% are at Capex 5 or beyond with a total estimated project cost of £1263m.

Scottish Water is projecting post-2009-10 expenditure on Q&S3a projects at £190m. This figure however includes the following programme adjustments:

Q&S3a Base Maintenance Overhang	-£38.188m
SG1 Transfer to SR10	-£15.602m
WG1 Transfer to SR10	-£5.282m
Q&S3a Risk Management Holding Code	+£21.000m

The large negative adjustments are intended to be redeployed into other projects in the Q&S3b investment period at which time the remaining value of the holding code will be correspondingly reduced. We continue to recommend that these adjustments are removed as soon as possible from the programme by making sufficient estimates of the work they are intended to cover and allocating these to specific projects. The expenditure contained in the Q&S3a risk management holding code will also be allocated to Q&S3a projects as the cost and distribution of the risks becomes clear. These positive and negative adjustments have been netted off the figures contained in the comparison table below to give the following summary for actual projects with overhang:

Number and Estimated Cost of Overhang Projects

All projects with overhang exceeding:	Number	Total estimated overhang £m
£0.5m	46	223
£1m	32	214
£5m	14	174
£10m	6	118

It can be seen that the bulk of overhang cost is concentrated in a comparatively small number of projects with significant post 2009/10 expenditures. These include in particular Glencorse New WTW, WTW upgrades where there have been difficulties in defining options and projects in the UID improvement programme.

Q&S3 Risk and Liability Allowance

Despite the Q&S2 and Q&S3a programmes moving towards their completion money remains allocated to risk and liabilities.

We have had visibility and reviewed the detail involved in Scottish Water's risk and liability allowances. However, for reasons of commercial confidentiality, these are not repeated here.

The total of these items indicates the uncertainty that remains around the completion of the Q&S2 and Q&S3a programmes.

We discussed the risks and liabilities making up the current register.

Autocode 40020

The total of £21.0M in this autocode relates to projects managed by CID. The figure comes from meetings held between Scottish Water and CID's management and do not directly originate from project managers. The £21.0M is made up as follows:

- £10.0M for UIDs.
- £1.0M for Kenmore and Newton Stewart.
- £2.0M for assets which SEPA has not accepted.
- £6.0M for Water Framework Directive projects.
- £2.0 known project risks.

Scottish Water reports that many of the above relate to projects that are pre-capex 2 and so remain Scottish Water's risks. We understand that while these allocations have been made they represent a more widespread risk allowance than indicated by the formal allocations.

Autocode 36660

We have had visibility and reviewed the detail involved in Scottish Water's risk and liability allowances. However, for reasons of commercial confidentiality, these are not repeated here.

While we understand that these items relate to many projects they have been allocated to the following drivers which has the potential to cause confusion at the programme level.

DW3:	+275.2%
WG1:	- 5.1%
WSNI:	-135%
CS11:	-35.1

We understand that these 2 autocodes have been the subject of discussion between Scottish Water and WICS.

Programme Adjustments

As well as the two projects discussed above there are 3 other projects that result in programme adjustments. These are:

- 40032 Q&S3a Base Mtce Overhang;
- 40036 SG1 Growth Transfer to SR10; and
- 40037 WG1 Growth Transfer to SR10.

We have requested information on these projects but to date have not received a response. The above Base Maintenance project was introduced following the letter from the WIC stating that the Capital Maintenance investment should be allocated to single regulatory periods and that where investment spanned 2 periods the funding should be split. We therefore recognise that the current individual project forecast is reported in QS3a and this adjustment line recognises that the forecast post 31st March 10 will be funded from SR10. By the same token the growth programme has also been treated in the same manor.

New Obligations since the Final Determination

Our comments on new obligations are given in our commentary on Tables G1 and G2.

Q&S3a Capex 5 Dates

In the Q&S2 programme Capex 5 dates indicated Beneficial Use. In Q&S3a Capex 5 dates are intended to signify internal acceptance which is usually after Beneficial Use and normally precedes quality regulator sign-off for appropriate projects. Three months is now allowed by Scottish Water between internal acceptance and quality regulator sign-off.

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 - G9, delivery of the output is in most cases claimed when internal sign-off is achieved at 'acceptance' milestone 4, rather than sign-off by the external regulator.

8.6.4 Checks on the Validity of Data in Table G6 – Q&s3a Projects

The Reporting Requirements ask the Reporter to undertake audits of a range of projects to check the validity of data in Tables G5 and G6. Our findings on Table G6 projects are summarised below.

Key Points from Investment Project Audits

A sample of projects was audited to check the validity of data in Table G6.

Information in Table G6 corresponded to the Quarterly Investment Report for the end of year 2009/10 (CIR Q4).

Information in CIR Q4 and Table G6 on estimated outturn cost and completion date in general corresponded to the project manager's latest best estimate (LBE), although often with small differences, particularly in total capex cost.

In most cases the Opex impact stated in Table G6 corresponded to the most recent Capex submission. This is because Opex impact is only revisited for Capex submissions. In one case the opex impact given in Table G6 did not correspond with the latest capex form or project manager's latest best estimate.

Proportional allocation of costs to outputs had, with only minor exceptions, been carried out in accordance with agreed guidelines and been revisited at each Capex stage.

During our audits we continued to note that the focus of SWS staff involved in projects remains on contract cost, rather than overall project cost. We found some examples where significant external risk factors (such as the need to agree consents or reach agreements with third parties), which could affect project completion dates, were not included in project risk registers, which focus on costed risks. We continue to recommend that project risk registers should be reviewed to ensure that they contain all risks, including those borne by Scottish Water, particularly where these could affect the completion date, but do not affect outturn cost.

We have concluded that the data given in Table G6 are a fair and representative picture of the programme as it stood at 31st March 2010 and are valid and sufficiently accurate for the purposes of the other G Tables. Estimates of post 2009-10 (overhang) expenditure for these Q&S3a projects are reasonable for the stages of development at which they currently stand.

Audit Process

The Reporting Requirements require the Reporter to check the validity of the data in Tables G5 and G6 for a variety of project sizes and types. In order to do this, a sample of 14 projects was audited, comprising 2 Q&S2 projects and 12 Q&S3a projects. The purpose of these investment project audits was to check on project capex and opex estimates, the project programme, drivers, risks and outputs and comment on their reliability. For each project the project manager was interviewed and project documentation was examined. Documentation reviewed included capex approval forms and supporting information, project risk registers, engineering drawings and specifications.

For each project the capex and opex estimates and programme dates contained in Table G6 were compared with:

- Information contained in Scottish Water's Capital Investment Report for the period ending March 2010 (CIR Q4)
- Capex approval paperwork
- The project manager's latest best estimate (LBE).

The allocation of drivers was checked and where the project had more than one driver, the proportional allocation of costs to drivers was checked. Risk registers were examined to determine factors relevant to the completion of the project by the forecast date.

All projects have been developed by Scottish Water or Scottish Water Solutions within the context of its capex reporting mechanisms and approval procedures. Information provided by SWS in capex submissions is checked and approved through the capex approvals procedure. Scottish Water also review project data in the preparation of each quarterly Capital Investment Report (CIR). Information input direct to CIMS by SWS by means of uploads from P6 remains briefly unchecked by Scottish Water until it reaches either a Capex submission or review for the CIR report.

Investment Project Audits

The projects audited and our conclusions upon them are given below:

<u>30072 Loch Leven Cluster WWTW</u>

This project is required to serve communities at Glencoe and South Ballachulish on the south side of Loch Leven. Following dispersion modelling an consultation with SEPA, proposals for direct discharges from the two communities to Loch Leven have been superseded due to poor dispersion of discharges in the loch upstream of the narrow neck of the sea loch and the proposal is to collect flows for treatment and discharge downstream of Ballachulish Bridge by a long sea outfall off North Ballachulish.

The current project consists of a pumping station at Glencoe, a rising main to S Ballachulish, a pumping station at S Ballachulish, a rising main with under-sea crossing to the treatment site at N Ballachulish and a long sea outfall from the WWTW. These works are all complete. The remaining work consists of extensions to the existing WWTW at N Ballachulish by the provision of 6 septic tanks.

On the latest Capex submission (Capex 4) the drivers are listed as EC01 (UWWTD) 49%, EC03 (Shellfish Directive) 49% SS (Gross MEAV of assets subject to maintenance work) 2% SG1 (growth) 0%. Growth is estimated as 195 p.e. and includes only granted outstanding planning permissions, including 70 p.e. for the Glencoe Hotel which is on hold pending the provision of capacity. Growth is correctly given as 0% as the work necessary to cater for the quality drivers will provide adequate capacity for the forseen growth. Proportional allocation appears to be correct.

The project has been subject to long delays due to the planning process, including a failed planning appeal, and vociferous local objections, despite strong SEPA support. The eventual proposal overcomes these by burying the proposed septic tanks so that there is no change in ground profile at the WWTW site, enabling permitted development powers to be used.

The risk register was inspected. Most risks have now been written off. Land has been purchased, CAR licences and the consent obtained and remaining risks are construction related. The project estimate contains £0.159m of risk cost. Completion of the works is expected by September 2010, but in the meantime flows from the N Ballachulish WWTW have been diverted down the new long outfall, providing environmental benefit and allowing a Beneficial Use date of March 2010 to be claimed.

The project manager's LBE of total cost is £6.277m, including post 2009/10 expenditure of £1.893m. This corresponds closely to the Table G6 and CIR Q4 total project costs of £6.280m.

The project manager's LBE of opex impact is +£39000 p.a. which corresponds with Table G6 and Capex 4. This cost will be revisted at Capex5 using as-built information.

The project manager's LBE of the Beneficial Use date is September 2010. This is consistent with the Table G6 Capex 5 date of Jan 2011.

We concluded that proportional allocation has been correctly carried out. The total project cost and post 2009/10 costs in Table G6 correspond closely with the project manager's LBE. The opex impact in Table G6 corresponds to the project manager's LBE and the Table G6 forecast Capex 5 date is consistent with the Project manager's LBE.

30095 Blackpark WTW

This project originally comprised an upgrade to the existing Blackpark WTW on Loch Einich, including raising the level of the loch. There was strong opposition to raising water levels, without which yields could not be realised so other sources were investigated. Long planning delays were experienced due to the finalisation of the Cairngorms National Park Local Plan. The current proposal is for three boreholes in the Spey valley. These have been test pumped and quality and quantity have been proven. A rising main, clear water tank and outlet main have begun construction and work on the new WTW is due to begin imminently.

Project drivers are listed on the current Capex submission (Capex 3) as DW13 (disinfection Control) 17%, DW3 (coliforms and turbidity) 17%, DW7 (Birds and Habitat Directive) 0%, WG1 (growth) 18%, WR1 (water resources) 48%. The costs allocated to quality drivers are based on estimate for the original Blackpark project, but with nothing allocated to DW7 as it is not relevant to the new project. The cost allocated to water resources is based on the additional cost of providing resources at the new location and the cost allocated to growth is the estimated cost of increasing capacity to meet future demands. This is consistent with the guidelines for capital allocation.

The risk register was inspected. Land has been purchased and CAR licences, the abstraction and discharge licence are all in place. The remaining risks are construction-related and add £0.840m to the project estimate.

The project manager's LBE of total project cost and post-2009/10 cost are £21.196m and £15.580m. This compares with Table G6 and CIR Q4 which both show £21.555m and £15.984m respectively.

The project manager's LBE of opex impact corresponds with Table G6 at +£379000. Costs are based on the opex model using contracted power costs and manufacturer's information.

The project manager's LBE of Beneficial Use is October 2011, corresponding with CIR Q4. Table G6 gives the Capex 5 date as the same, which is inconsistent as Capex 5 is usually around 3 months after BU.

We concluded that capital allocation had been carried out in accordance with the guidelines. Table G6 slightly overstates total capital cost and post-2009/10 cost compared with the project manager's LBE. Opex costs in Table G6 corresponds with the project manager's LBE. The Table G6 Capex 5 date is inconsistent with the project manager's LBE.

30190 Dalscone STW (Old and New) WWTW – CM and Growth

Dalscone STW consists of two separate, parallel streams, the old percolating filter works and the new aeration ditch works.

The project is required for growth and capital maintenance. Necessary capital maintenance is small and the main purpose of the project is to serve significant growth in the area and remove development constraints. There is no significant change in the consent required, compared with the existing 20 SS/30 BOD.

The proposed works originally consisted of a new inlet works for both streams, plus new primary sedimentation tanks and conventional humus tanks, filter refurbishment and the conversion of the old primary sedimentation tanks to storm tanks for the old works. Work was begun on site but then stopped due to the emergence of a flooding problem caused by backing up of river levels through the outfall and affecting the area of the new humus tanks. The project was redesigned to relocate the humus tanks to higher ground and introduce inter-stage pumping. However land could not be bought to accommodate the relocation of the humus tanks, resulting in a further design change and the introduction of lamella humus tanks at a different location within the existing site.

As the contractor was on site during the above changes under a cost-paid (framework) contract, delays led to significant cost increases, which also included increased design cost and the cost of test-pumping and licencing temporary ground dewatering.

Proportional allocation of cost to drivers was checked. Capex 4b, the most recent approval, shows SG1 (Growth) 9% and WWNI (Capital Maintenance) 91%. These proportions were assessed at Capex 3 stage by estimating the actual cost of construction items directly attributable to capital maintenance, with the remaining cost attributed to growth. This is in accordance with guidance agreed with WICS. However the project content and cost have changed significantly and it is believed that these proportions do not reflect the project as it now stands.

The project risk register was reviewed and was seen to include £0.724m of risk cost, mainly corresponding to construction risk and included in the current project cost estimate. This appears conservative.

Work is continuing on site and the project currently has Capex 4b approval. The estimated total costs and post 2009/10 costs in Table G6 and CIR Q4 both correspond with the project manager's LBE at £9.155m and £4.321m respectively.

The opex impact figure given in Table G6 is zero. However the project manager's LBE is +£44,000 p.a.

The project manager's LBE of the Beneficial Use date is October 2010, corresponding to the CIR Q4 date and this is consistent with the Table G6 Capex 5 date of January 2011.

We concluded that proportional allocation has not been revisited for the current project content. The total estimated cost and post-2009/10 cost in Table G6 are consistent with the project manager's LBE. The opex impact of the project is understated in Table G6. The Table G6 Capex 5 date is consistent with CIR Q5 and the project manager's LBE.

31111 UID 130 East of Gilmore Close

This project is required to improve water quality in the Gartsherrie Burn by improving three unsatisfactory CSOs. The project drivers are EC01 – UWWTD, EC04 – Freshwater, Fish and EC10 – Water Framework Directive. As the same solution delivers all of the quality benefits, cost has correctly been divided equally between the three drivers.

Verified water quality modelling has demonstrated the need to improve three CSOs in the vicinity and the scope of work in the project includes: a new CSO east of Gilmore Close with mechanically-raked screen and 1500 cubic metres of storage in a shaft, with pumped emptying controlled by telemetry downstream at Heritage Way; the raising of the weir at the existing CSO east of Hermitage Way and the provision of mechanically-raked screens; the provision of 2500 cubic metres of online storage downstream of the existing CSO west of Glenmavis together with the renewal of the Glenmavis overflow.

All three elements of the work are substantially complete. The project manager's latest best estimate (LBE) of total cost is £4.470m, while Table G6 and CIR Q4 show £4.508m. The LBE for post 2009/10 expenditure (overhang) is £ 0.755m although both Table G6 and CIR Q4 show overhang of £1.277m.

The LBE for opex impact is +£15000 p.a., corresponding to the Capex 3 submission, although Table G6 shows +£6000 p.a.

The LBE for regulatory sign-off is July 2010. CIR Q4 shows June 2010, while Table G6 shows Capex 5 forecast to be October 2010, which is consistent with the LBE.

We concluded that proportional allocation has been correctly carried out. The total cost reported in Table G6 is close to the project manager's LBE, but overhang is significantly overstated in Table G6, compared with the LBE. Opex impact is understated in Table G6. The predicted regulatory sign-off date shown in Table G6 is consistent with the CIR and LBE.

33155 NRSWA Service Relocation - Edinburgh City Tramlines

This project is for the relocation of mains and sewers in connection with the construction of the Edinburgh Tram network by the Transport Infrastructure Edinburgh (TIE) group. Virtually all of the relocation work is done by the TIE contractors at TIE cost. Scottish Water costs allocated to project 33155 cover Scottish Water's costs for planning and operational staff time, contributions for betterment and sewer surveying and Scottish Water's risk allocation for the project, which currently amounts to £2.508m. About half of the estimated project cost is for Scottish Water staff time. Costs are covered by a legal agreement between Scottish Water and TIE known as the MUDFA (Multi-utility Diversion Framework Agreement).

The originally agreed scope of diversions (the primary diversions) was expected to be completed by July 2008, but will not now be completed until July 2010 due, among other things, to contractual disputes between TIE and its contractors. A further group of relocations (the secondary diversions) will be required due to design changes including re-routing and an increase in the assessed size of the below-ground envelope (the Dynamic/Kinetic envelope – DKE) within which services must be moved. It has been further agreed that Scottish Water will in conjunction with the tramlines work deal with all grade 3 sewers lying in the DKE, investigate a leak at Gogar and divert services in Constitution Street. These changes and additions have caused delay and it is not yet clear when work will be completed. In the worst case this could be as late as 2014.

The cost of the work is currently allocated equally to water and sewerage capital maintenance, which is reasonable given the fluid scope of the work. This percentage allocation will be revisited when actual costs are clear.

The risk register contains a calculated risk cost of £2.508m, based on Scottish Water's best assessment of the likely eventual cost and completion date for the work. This risk cost is currently held in years 2011/2 and 2012/3 of the programme.

It is currently difficult to be sure of the likely total capex cost, capex phasing and completion date. It is assessed that the project will nave a net neutral effect on opex.

Both CIR Q4 and Table G6 show project total cost as £17.040m and post-2009/10 cost as £8.956m, although these are expected to reduce soon to £16.309m and £8.148m respectively, following the submission of a Capex 4.2 form, reflecting the LBE.

CIR Q4 shows a Beneficial Use date of December 2012, which is consistent with the G6 forecast Capex 5 date of September 2013, although the project manager's LBE of Capex 5 date is July 2013.

We concluded that proportional allocation is reasonable at this stage of the project. The costs and dates shown in Table G6 are the best estimate which can currently be made given the uncertainty in the project. Overhang into the Q&S3b period is significant and its eventual magnitude is still uncertain.

31434 UID WP6.1 Kilmarnock Gravity Transfer Scheme

This project is to improve water quality in the River Irvine by closing four unsatisfactory CSOs in the centre of Kilmarnock and transferring flows downstream by gravity to existing tanks at Gatehead for transfer to Meadowhead WWTW. Project costs have been divided equally between the project quality drivers of EC01 (Bathing Waters), EC02 (Freshwater Fisheries) and EC10 (Water Framework Directive), in accordance with capital allocation guidelines.

The project comprises improvements to CSOs and gravity sewerage with large diameter pipes, potentially including tunnelling and involving complex and difficult working in town streets and a riverbed. The project was originally tendered, based on a detailed design, in April 2009. Following appraisal of tenders a contractor was engaged to develop the design, appraise the route and other options pending finalisation of the contract. However it proved impossible to reach satisfactory commercial arrangements with the selected contractor, whose bid was, upon detailed examination, felt to be incomplete. This contractor agreed to withdraw and was replaced by the reserve (second-lowest) bidder. This second contractor has engaged the original project designer and is engaged in site investigation, surveying and a review of the options to minimise cost.

The contract form is NEC Lump Sum Design and Build with no pain/gain provision. It is not clear that this arrangement results in best value for money compared with the alternative of retendering the work when the arrangement with the first tenderer was terminated. Scottish Water took the view that the delay resulting from a re-tender, with the potential for reputational damage which this would entail, was unacceptable. In reaching this decision Scottish Water took into account the fact that the reserve bidder's price was similar to its own internal estimate of project cost.

The project risk register was examined. This is based on the original contractor's bid. All ground risk will be borne by the contractor. Planning permission has been obtained. Land will be required, but this cannot be bought until options have been finalised and CAR licences will be required, especially for working in the river. These issues could result in delay. The project estimate currently contains a risk cost of £6.868m.

The project manager's LBE of total capital cost is £16.013m, almost all of which is post-2009/10. CIR Q4 and Table G6 both show a total cost of £17.046m. However these figures are likely to be superseded when the reserve bidder has completed its work on design.

Table G6 shows an opex impact of +£1000 p.a., which is based on the Capex 3 figure and appears to be a nominal estimate.

The project manager's LBE of the Beneficial Use date is August 2012, which is reflected in CIR Q4 and is consistent with the Table G6 forecast Capex 5 date of January 2013.

We concluded that the correct procedures had been followed for proportional allocation of costs. The project manager's LBE of total capital cost was lower than the figures shown in Table G6 and CIR Q4, although this cost is likely to be amended when the reserve bidder has completed design work. The forecast Capex 5 date in Table G6 is consistent with the project manager's LBE.

30408 Killylour WTW Upgrade and
38100 Killylour Strategic Solution

Killylour WTW is a pressure filter works with disinfection, fed from an impounding reservoir, serving a population of 35,000. The works uses 12 Bell pressure filters and there is also a disused bank of Paterson filters.

The site has Q&S3a drivers for coliforms, aluminium, Cryptosporidium, disinfection control, growth and capital maintenance. Within project 30408 these drivers were planned to be met, including growth for an additional population equivalent of 7152, corresponding to the Growth Model Raw figure for the area served. This gave an increase in throughput of 2.2 Ml/d and the proposal was to provide a complete new works using dissolved air flotation and rapid gravity filters and process design has been completed for this.

However this project has been stopped due to difficulties over land purchase and planning permission and the unwillingness of SEPA to issue a revised abstraction licence for the surface water source as the proposed abstraction significantly exceeded that currently licensed and also exceeded Scottish Water's own estimate of sustainable yield. This results in delaying the delivery of the quality outputs until the Q&S3b investment period. Agreement to defer these outputs, reached with WICS through OMG was confirmed from inspection of OMGWG minutes.

Scottish Water now propose to abandon the WTW by means of a connection to the network as part of project number 38100. This project will meet the quality drivers but the growth and capital maintenance drivers have been dropped from the project. During the period of delay caused by problems with the original project, Killylour has continued to meet demands with acceptable quality but the strategic solution is still required as there are significant supply demand issues in the area and the works cannot meet future demands with acceptable quality. Growth will be reassessed when the strategic solution has been better defined.

Project 30408 has been closed with a cost of £0.715m and has Capex 5 approval at this value, which is reflected in both Table G6 and in CIR Q4. Table G6 and CIR Q4 also confirm that project 38100 has Capex 1 approval at a cost of £5.800m, corresponding to the AR06 Table K estimate, with no allowance for inflation. No better estimate can be made at this stage. At this early stage of the project there is no risk register, opex costs are unknown, completion dates have not been defined and there is no proportional allocation of capex costs.

We concluded that the forecast total cost given in Table G6 corresponded to the project manager's LBE. Uncertainty remains over the shape of the eventual solution, capex and opex costs and completion date. No proportional allocation of costs has yet been made.

34831 Invercannie and Mannofield WRZ/WFD

This project is required to allow a reduction of abstraction from the Water of Dye at Glendye WTW, in line with the requirements of the Water Framework Directive. Following a strategic study and value management exercise, to achieve this a pipeline will be constructed from Invercannie WTW, where water is abstracted from the R Dee to feed Aberdeen. Glendye WTW will then be mothballed with no capital expenditure.

To feed Glendye, water will be abstracted from the 1924 aqueduct, which transmits treated water, and be pumped to Glendye. The project is currently approaching Capex 2 approval. All options include orthophosphate dosing, a pumping station, a rock tunnel under the R Dee and a rising main running mainly thorough forestry to Glendye. Options under consideration relate only to the location of the pumping station. The rock tunnel is considered to be the only feasible option for the river crossing due to planning and fisheries considerations.

The risk register was inspected. No planning permissions or land purchase are needed and no EIA is required. The principal cost risks are due to unforeseen ground conditions in the tunnel and to the potential for damage to the pipeline in the forestry by forestry vehicles. The project estimate includes a risk cost of £1.237m, virtually all of which is borne by Scottish Water.

The project drivers are given on Capex 1b (the current latest capex approval) as WR1 (Water Framework Directive) 100%, WW1 (capital maintenance) "% TBC", implying that a capital maintenance driver will be claimed. Table G6 includes a capital maintenance cost of £3.901m. In our view this is not justified. The currently proposed project avoids the need to make capital maintenance expenditure at Glendye WTW, but no part of the project corresponds to the capital maintenance of an existing asset.

The current estimate of capital cost is based on a detailed design, including pipeline profiles and the EES pricing model. Table G6 and CIR Q4 show a total capital cost of £6.972m, slightly exceeding the project manager's LBE of £6.745m. Virtually all of this expenditure is post-2009/10.

At this early stage of the project, no estimate of opex impact has been made.

The project manager's LBE of the Capex 2 date is May 2010, while CIR Q4 shows August 2010 and Table G6 October 2008, which appears to relate to the superseded project to refurbish Glendye WTW. The LBE of project Beneficial Use is February 2012, which is consistent with the Table G6 Capex 5 date of May 2012.

We concluded that proportional allocation in Table G6 was incorrect. The Table G6 estimate of total cost marginally exceeds the project manager's LBE. No estimate of opex impact has yet been made. The completion date shown in Table G6 is consistent with the project manager's LBE.

37769 WWRS Controls on Abstraction and Impoundment

This project is essentially a holding code for Water Framework Directive projects which are as yet undefined. Strategic studies have been carried out on all 78 water resource zones (WRZs). 38 of these were judged to be complex and most of these have been subject to a value management process. The project covers 5 WRZs which require further study to bring down costs to a level acceptable to Scottish Water and SEPA. These zones are Black Esk, Clatto, Glengap, Milngavie and the North Coast Regional Scheme. The project also contains monitoring costs for some further zones.

Scottish Water has proposed to SEPA the extent of work to be carried out in each of the remaining zones where work is required and the cost has been estimated on a site-by-site basis using either Scottish Water's internal estimating database or costs from similar recent projects. These costs make up the project manager's LBE which is the same as the current capex approval (Capex 1, dated January 2010) of £10.353m. CIR Q4 and Table G6 however agree in showing a total capital cost of £10.252m. £9.652m of this cost falls into the Q&S3b investment period.

As SEPA approval is required to the scope of work, the extent of this work and its cost may vary due either to delay or to an increased scope of work, but no better estimate can be made at present.

Project costs are correctly allocated entirely to the water resources code WR1. At this early stage of the project there is no risk register and no estimate of opex impact has yet been made. As this is a holding code no programme dates are quoted. As each element of work is agreed it will be set up in a new project and the value of the current project reduced accordingly until it is eventually closed.

We concluded that costs had been correctly apportioned and that the estimated project cost was reasonable given the early stage of development of the proposals. Costs have been slightly understated in Table G6, compared with the project manager's LBE.

36450 Perth WWTW Odour Control – Phase 2

Perth WWTW is a site with a history of odour complaints arising mainly from its use as a sludge thickening centre and the proximity of houses on the other side of the River Tay from the works. Some odour control measures are already in place and phase one of the work consisted of the completion of a survey and report on existing odour control measures. The survey concluded that these were not working as well as expected and that the main source of odour was the storage and loading of limed sludge cake.

The WWTW is an aeration plant with sludge holding tanks, followed by sludge thickening by belt presses and the addition of lime. Limed sludge cake is currently stored on open concrete slabs and the principal odour nuisance is caused when this sludge is disturbed during loading for removal from site for disposal to land.

The proposed project, which has Capex 3 approval dated January 2010, will end the slab storage of sludge cake by providing a sludge storage silo with storage for 3 days production. The silo will be mounted over an enclosed lorry-loading building. The sludge loading conveyor, silo and building will be provided with air extraction and odours will be removed using an acid scrubber to remove ammonia followed by powdered activated carbon to remove residual odours.

The odour proposals have been developed following dispersion modelling verified by sampling at complainant locations and the measures designed to provide defined, reduced odour levels at those locations. The proposed plant is supported by odour removal guarantees, although these refer to odour removal at source, not at the locations where complaints originate.

The sole driver for the work is odour removal. The contract is currently on site, groundworks are complete and E&M design and ordering has been finished. The risk register for the project was inspected. No land purchase is required, planning permission has been obtained, the proposals have been signed off by the Scottish Odours Steering Group (SOSG) and most of the remaining risk is construction risk, carried by the contractor. The project estimate includes a risk cost of £0.183m.

The current approval is Capex 3 at a total cost of £2.911m. This corresponds with the project manager's LBE, Table G6 and CIR Q4. The phasing of cost has been based on the contractor's construction programme.

The opex impact was calculated based on manufacturer's data for the Capex 3 submission at +£75,000 p.a. This is the project manager's LBE and the figure given in Table G6. Opex costs will be reviewed on completion of the project.

The project manager's LBE of the Capex 5 date is October 2010, which corresponds with Table G6 and is consistent with the Beneficial Use date of June 2010 shown in CIR Q4.

We concluded that costs had been correctly allocated to the single driver, that Table G6 accurately reflected the project manager's LBE of total cost, phasing and completion date and that the estimate of opex impact was reasonable.

<u>37781 UID Cumbernauld USWO</u>

This project is required to rectify unsatisfactory surface water discharges from the separate surface water system in Cumbernauld, affecting water quality in the Red Burn. SEPA's principal concerns are over heavy metals and hydrocarbons. By agreement with SEPA Scottish Water is concentrating on 9 surface water discharges from the industrial area in the lower part of the Cumbernauld catchment. The proposed project will create 8 permanent on-line ponds each of which will have a smaller settlement area separated from a larger retention area by a permeable gabion wall. The design of the ponds is based on CIRIA design guidelines and SEPA have endorsed the design.

Costs have been correctly allocated in equal proportions to the two quality drivers EC10 (Water Framework Directive) and EC09 (Dangerous Substances).

The project currently has Capex 2 approval. The risk register was inspected. The main risks affecting cost are ground conditions, due to the possibility of rock, and land purchase. At this early stage of the project site investigation has not yet been carried out and land has not been bought. Further risks, which could potentially result in delay, are planning permission and access. The project estimate currently contains a risk cost of £1.272m, some 25% of the overall cost. This appears conservative but could reduce as the project is developed and site investigation is completed. The project estimate was prepared using EES Cost yardsticks with outline quantities and COPI applied.

The project manager's LBE of total project cost is £5.153m, virtually all of which falls after 2009/10. Table G6 and CIR Q4 agree in giving a total project cost of £5.172m.

Table G6 gives the opex impact as +£4000 p.a., in line with the Capex 2 estimate and project manager's LBE.

There is uncertainty over when road access can be obtained to the works due to adjacent trunk road works. The project manager's LBE of the Beneficial Use date is July 2011, although CIR Q4 gives the Beneficial Use date as March 2012, which is consistent with the Capex 5 date of June 2012 given in Table G6.

We concluded that proportional allocation had been correctly carried out. Table G6 gives a total project cost marginally higher than the project manager's LBE. Opex impact in Table G6 corresponds with the project manager's LBE. There is some inconsistency in project completion dates between Table G6 and the project manager's LBE.

Summary of Investment Project Costs and Completion Dates

A summary of project costs and completion dates is given below:

Project (summary titles)	Total capex £m		Opex impact £000 p.a.		Completion date	
	LBE	Table G6	LBE	Table G6	LBE for BU	Table G6 Capex5
30072 Loch Leven Cluster WWTW	6.277	6.280	39	39	Sept 2010	Jan 2011
30095 Blackpark WTW	21.196	21.555	379	379	Oct 2011	Oct 2011
30190 Dalscone WWTW	9.155	9.155	44	44	Oct 2010	Jan 2011
31111 UID East of Gilmore Close	4.470	4.508	15	6	June 2010	Oct 2010
33155 NRSWA Edinburgh Tram	16.309	17.040	0	0	Dec 2012	Sept 2013
30408 Killylour WTW Upgrade	0.715	0.715	0	0	Project closed	
38100 Killylour Strategic Solution	5.8	5.8	Not known	Not known	Not known	Not known
34831 Invercannie and Mannofield WRZ/WFD	6.745	6.972	Not known	Not known	Feb 2012	May 2012
37769 WWRS Controls on Abstraction and Imp.	10.353	10.252	0	0	N/A	N/A
36450 Perth WWTW Odour	2.911	2.911	75	75	June 2010	Oct 2010
37781 UID Cumbernauld USWO	5.153	5.172	4	4	July 2011	June 2012

Conclusions from the Investment Project Audits

From this sample audit we concluded that total capex for the projects audited corresponded exactly with the figures in CIR Q4, although always not with the project manager's latest best estimate. Opex impact corresponded with the most recent capex approval because it is not revisited except at capex approval stages, although one opex impact was understated in Table G6, compared with the latest capex form and project manager's latest best estimate. In most cases the project manager's latest best estimate of completion date was consistent with Table G6.

We also concluded that the Capex 5 date given in Table G6 was consistent with the project manager's latest best estimate of Beneficial Use date and that proportional allocation of costs to outputs had, with only minor exceptions, been carried out in accordance with agreed guidelines and revisited at each Capex stage.

From our investment project audits we concluded that the data given in Table G6 are a fair and representative picture of the programme as it stood at 31st March 2010 and are valid and sufficiently accurate for the purposes of the other G Tables. Estimates of post 2009-10 (overhang) expenditure for these Q&S3a projects are reasonable for the stages of development at which they currently stand.

8.6.5 Comments by Line

These are not appropriate for Table G6.

8.6.6 Comments by Confidence Grade

Confidence grades are not allocated to Table G6.

8.7 Table G7 – Q&S2 Output Delivery

Commentary by REPORTER

Introduction

Key Points

- We have audited the table data and sample lines have been reconciled with the base data.
- 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, the base data and Table G5. In some cases paperwork to substantiate project completion and output delivery was not available.
- Data on WIC 16 Progress was found to be consistent with base data and with Table G5. Of 53 projects all but two have been signed off. Of these, one was completed on site in April 2010 and the other is complete, but the regulator is not yet prepared to sign off the output because of a discharge consent issue on a linked water treatment works project.
- Scottish Water has a rigorous and well-managed process for identifying and submitting relevant projects for regulatory sign-off and monitoring progress. However the data in lines G7.13 and G7.14 were not consistent with the data in this system.
- Progress has been made in achieving regulatory sign-off. However a number of cases remain where work on a particular site cannot be achieved because work is needed at a linked site. This is a factor in delays in sign-off. Scottish Water has submitted 1140 projects to SEPA for sign-off, of which 1101 have actually been signed off. Scottish Water is now forecasting completion of 6 projects delivering Q&S2 quality outputs after 31st March 2010.
- Information in Table G7 (and also Tables G8 and G9) is heavily reliant on the completion by delivery partners and others of spreadsheets which require significant manipulation and careful version control. It is understood that Scottish Water is working on a system development (CISP) which will bring together investment programme monitoring, control and reporting in a corporate data repository. This may be expected to improve the reliability of the data.

Audit Process

During the audit we reviewed:

- Sources of data to confirm Q&S2 output delivery for table lines with output delivery in the report year
- The methodology for compiling the output table
- Progress on a project-by-project basis against the WIC16 programme

- Sources of data and the methodology for agreeing the sign-off of regulatory outputs with regulators
- Progress on the sign-off of Q&S2 projects, including variations to the total needing sign-off

We also audited each line of the table to confirm the audit trail back to the base data. The audit was carried out by interviewing members of Scottish Water staff responsible for the compilation of the tables and with direct, unrestricted access to data held on Scottish Water information systems.

Methodology

The Company has reported progress on outputs by Beneficial Use date, which corresponds to Milestone 4 in the Quarterly Capital Investment Report. To monitor progress against Q&S2 outputs, Scottish Water maintains a spreadsheet for each output, with data updated periodically from CIMS.

Progress with Q&S2 Outputs

To monitor progress Scottish Water maintains a spreadsheet updated periodically from CIMS data, listing the outputs delivered by each project and confirming its actual or forecast Beneficial Use date. Quarter-by-quarter targets are set by reference to the expected Beneficial Use dates of projects due to be completed in that year. Data in lines G7.1 to G7.9 are abstracted from the spreadsheet.

WIC 16 Progress

Scottish Water maintains a spreadsheet listing all WIC 16 projects, updated periodically from CIMS data, listing actual and forecast Beneficial Use dates, from which data are abstracted to report progress in lines G7.10 to G7.12.

Q&S2 Sign-off Process

Information on progress against Q&S2 sign-off is collected from Investment Planning by means of a spreadsheet which is updated by IP with information on current progress, returned on a quarterly basis and also used as the basis of data in Table G7 lines 1 to 9. This lists all projects requiring sign-off, including a reconciliation for those which have been removed from the target by agreement of the appropriate regulator, together with their current status. The stages listed are: completed to Beneficial Use status, submitted to regulator for sign-off and signed-off.

Procedures for regulatory sign off of projects with defined quality outputs, developed by DWQR, SEPA and Scottish Water, have been in place for a number of years. 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 offers 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 "Water Into Supply Certificate" for drinking water quality projects; or

- A "Wastewater Regulatory Output Approval Form" for wastewater quality projects.

The relevant forms are prepared by the Capital Investment Delivery team. They are reviewed and signed off as appropriate on behalf of Scottish Water by representatives of Asset Investment and Management (AIM) and Customer Service Delivery (CSD).

In addition to addressing on-going projects Scottish Water has continued 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 AIM and CSD for confirmation that the output is complete before submission to the relevant regulator for authorisation.

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.

In some cases the regulator is not prepared to sign off individual projects upon achievement of Beneficial Use because work is required on a linked site. Examples include projects where a drinking water quality driver is achieved by abandoning a source and connecting its supply area to another source to provide an alternative supply. If work is also required in the second supply area to meet quality criteria the regulator will usually refuse to sign off the project for the first area. This can involve significant delay.

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, sign-off may be based on consent compliance rather than a 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.

In addition to a description of the improvements made, the Output Delivery Sign-off sheets include purpose codes, output driver codes and quantities, output codes and quantities.

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. In previous years we have concluded that the process was robust and accurate and record keeping was good.

We understand that 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 required standard.

Conclusions

Q&S2 Outputs

For lines where outputs are programmed to be delivered in the report year (lines G7.3, G7.5, G7.9), the base data in the output monitoring spreadsheet were checked. For each line the projects and outputs making up the target and the actual output in the base data were checked and seen to be consistent with the table lines. It was however not possible to confirm completion from Capex paperwork in all cases and some regulatory sign-off paperwork was not available. More detailed comments are given in Comments by Line below.

WIC 16 Progress

The WIC16 progress monitoring spreadsheet was checked and found to be consistent with the data in lines G7.10 to G7.12 and with Table G5. Comments are given in Comments by Line, below.

Q&S2 Sign-off

At the audit the Q&S2 sign-off spreadsheet was reviewed. For each line the number of projects listed as being at that particular stage was checked against the appropriate table line. An inconsistency was noted between two table lines and the data in the spreadsheet. Details are given in Comments by Line below.

Comments by Line

Lines 1 and 7: First-time Provision of Water and Sewerage Services.

Line 2: Removal of Properties from the Poor Pressure Register

Lines 4 and 8: Rehabilitation of Water Mains and Sewers

Line 6: Removal of Properties from the At-risk Flooding Register

For these lines, targeted delivery was equalled or exceeded before the start of the report year and there is no target for the report year or subsequent years. These lines were not audited.

Line 3: 6 drinking water outputs were delivered in the year by the completion of 3 projects. Completion was confirmed by reference to Capex paperwork, but regulatory sign-off paperwork was only available for one of the three projects. Delivery by quarter could not be confirmed from the information available.

Line 5: 4 continuous discharges were removed in the year by the completion of 4 projects. It was not possible to confirm completion by reference to Capex paperwork for two of the four projects and regulatory sign-off paperwork was only available for two of the four projects. Delivery by quarter could not be confirmed from the information available.

Line 9: 4 UCSO outputs were delivered in the year by the completion of 3 projects. Completion was confirmed by reference to Capex paperwork for all projects and regulatory sign-off paperwork was also seen for all of the projects. Delivery by quarter could not be confirmed from the information available.

Lines 10 - 12: Data on WIC 16 Progress was found to be consistent with base data and with Table G5. The original Ministerial Target was 61 projects. Eight have been removed with the agreement of the regulator, leaving 53. Of these 53 all but two have been signed off. These are 9638 – WIC 16 Lismore Primary, which was completed on site in April 2010 and 9640 – WIC 16 Straloch Primary. Work at Straloch is complete, but the regulator is not yet prepared to sign off the output because of a discharge consent issue on a linked water treatment works project. The forecast WIC16 completion date of 27/7/10 corresponds to the forecast date for the resolution of the discharge consent issue.

Lines 13 - 17: We have reviewed the Q&S2 sign-off process in previous audits. Our comments on the methodology are set out above. During our audit we were able to confirm 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.

At the time of the audit the total number of projects for sign-off was shown on the monitoring spreadsheet as 1161 and the make-up of this total was confirmed. However one project (328 - Newhall) was deferred on 31st March 2010 with the agreement of OMG. This change was not taken into account in the spreadsheet or the reported numbers for lines G7.13 and G7.14. . Lines G7.15 and G7.16 agree with the spreadsheet data and line G7.17 is correct by calculation.

Confidence Grades

Scottish Water has claimed a confidence grade of A1 for all of the lines in Table G7. This is not supported in all cases. Information in Table G7 (and also Tables G8 and G9) is heavily reliant on the completion by delivery partners and others of spreadsheets which require significant manipulation and careful version control. Comments are given by line below.

Lines 1, 2, 4, 6, 7 & 8:A grade of A1 is supported for these outputs, where work is complete and the outputs have been delivered.

Lines 3, 5 and 9: Information to substantiate completion and sign-off was not available in some cases and a grade of B2 is recommended.

Lines 10 - 11: The claimed grade of A1 is supported.

Line 12: There is uncertainty over the date on which sign-off will be achieved for Straloch Primary and a grade of B2 is recommended.

Lines 13 – 17: Data on sign-off are reliant on the cooperation of others and the completion of spreadsheets which require significant manipulation and careful version control. A grade of B1 is proposed, rather than the A1 grade allocated by Scottish Water.

8.8 Table G8 – Q&S3 Ministerial Objectives and Other Outputs – Quality

Commentary by REPORTER

Key Points

- We have audited the table data and confirmed consistency with CIR Q4 and Table G6. Sample lines have been reconciled with the base data.

- Scottish Water has a robust and well-managed process for agreeing changes to targets and confirming the delivery of outputs.

- Most Ministerial Objectives have met their delivery targets for the investment period. Exceptions are works where odour problems are addressed (line 1), improvement of disinfection for 4 million people (line 3), the number of abstraction zones with reduced abstraction (line 5), number of UIDs improved (line 12), number of WWTWs improved to meet new consent conditions (line 13) and the number of first time wastewater provisions (line 14).

- 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.

- This year Scottish Water has only claimed development constraints eased as a result of engineering solutions. Most estimates are based on project team estimates and not the Growth Model.

- Apart from 2 work packages that have been re-phased into the SR10 programme there is only a single output still to be delivered from the Strategic UID programme.

- Scottish Water has made good progress with the sign-off of the Q&S3a programme during the year. Of 877 projects requiring sign-off, 788 have reached Beneficial Use, 698 have been submitted for sign-off and 657 (75%) actually signed off. 10 percent of Q&S3a projects requiring sign-off were uncompleted at the year-end.

Audit Process

During the audit we reviewed:

- Sources of data on Q&S3a output delivery

- The consistency of Tables G6, G8 and CIR Q4

- The methodology for compiling the output table

- Sources of data and the methodology for agreeing the sign-off of regulatory outputs with regulators, including change control procedures

- Progress on the sign-off of Q&S3a projects, including reconciling the progress-monitoring spreadsheet with base data

We also audited each line of the table to confirm the audit trail back to the base data. The audit was carried out by interviewing members of Scottish Water staff responsible for the compilation of the tables and with direct, unrestricted access to data held on Scottish Water information systems.

Methodology

Scottish Water has appointed managers responsible for each line in the tables. It maintains tracking spreadsheets and meets project managers on a monthly basis to challenge and agree the delivery of benefits. In addition to taking data from CIMS, project managers are required to confirm regulatory acceptance using paperwork which also confirms the outputs delivered. No-build solutions may be included so long as the required benefits are delivered.

Scottish Water maintains a tracker spreadsheet for all Q&S3a quality outputs, listing for each project the site(s), drivers, population, Scottish Water region, changes to the Technical Expression, internal acceptance and progress on sign-off. This is based on WICS CIR Output Macro Sheet, with data abstracted by pivot tables.

For the current investment period, completion is claimed upon internal acceptance. For SR10 completion cannot be claimed until the regulator has signed off the outputs and it will be necessary to build this delay into the programme, allowing three months for sign-off.

Targets were agreed for each quality output as part of the agreement of SR06. There is 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. Targets for 2009-10 have been set to bring the March 31st 2009 position up to the Ministerial Target by the end of March 2010, profiled as per the Business Plan.

Scottish Water uses sign-off sheets to confirm both sign-off and solution changes with the Outputs Monitoring Group Working Group (OMGWG). Examples were seen during the audit. OMGWG also maintains a register of change proposals and sign-offs which is reviewed and updated on a monthly basis.

Further comments are given where relevant against the individual table lines below.

Conclusions

Sample data were checked for the lines audited, which showed that lines in Table G8 were consistent with the Quarterly Investment Report for Quarter 4 (CIR Q4) and with Table G6. Where appropriate documentation was also seen confirming completion. Specific conclusions are given in our comments by line, below.

Consistency with Table G6

The date used for achievement of the output is the internal acceptance date (Milestone 4). This date does not appear in Table G6, so a direct comparison was not possible. However sample projects were checked and the date claimed was seen to be always before the Capex 5 date given in Table G6, so the information appears consistent.

Progress with Q&S3a Sign-off

Most projects are signed off within 3 months. However a small number of sites are subject to delayed sign-off. All of these are sites where a drinking water quality output is planned to be delivered by connecting to an alternative supply zone and work is also required in the new zone. DWQR is not prepared to sign off until this work is also complete. Scottish Water maintains a robust process for agreeing output targets and changes, monitoring changes and sign-off, using sign-off sheets to confirm both sign-off and solution changes with the Outputs Monitoring Group Working Group (OMGWG). OMGWG maintains a register of change proposals and sign-offs, which is reviewed and updated on a monthly basis.

Scottish Water maintains a tracker spreadsheet for all Q&S3a quality outputs, listing for each project the site(s), drivers, population, Scottish Water region, changes to the Technical Expression, internal acceptance and progress on sign-off. This is based on WICS CIR Output Macro Sheet, with data abstracted by pivot tables.

Comments by Line

Lines 1 – 17: Outputs in this group have a common audit trail. This was followed for the lines reviewed from CIR Q4 to the table lines, comparing outputs from completed investment projects and checking the consistency of completion dates.

In all cases Tables G6, G8 and CIR Q4 were found to be consistent. 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.

Line 1 - Customer Service- Odours:

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&S3a 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 one project (Kirkaldy WTW) has been completed in the report year. The running total of 11 outputs was reconciled with CIR Q4 and is below the cumulative target of 14. Three sites are now expected to be completed in 2010-11 (Perth, Troqueer and Castle Douglas).

Lines 2 to 11 – Water Quality:

As part of the agreement of SR06 Scottish Water agreed with DWQR a target list of water quality projects. This included both 'green' and 'amber' projects. Green projects were to be robustly delivered by Scottish Water, while amber projects were to be delivered using operational measures or capital maintenance expenditure. The Company maintains a spreadsheet summarising progress on agreement with DWQR of the achievement of these outputs. The Company reports that for each works with quality improvements 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.

Lines 2 –3 – Improve Drinking Water Quality and Disinfection Control:

The claimed outputs of 1.07 million people for line 2 and 1.08 million people for line 3 were checked and substantiated by reference to CIR Q4. Claimed completion dates were checked for five sample projects and the data seen to be consistent with Table G6 and CIR Q4 data.

In some cases 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.

Line 4 – Lead Pipes Replaced as a Result of Customer Requests:

The Company reports that there have been 459 recorded customer requests for lead pipe replacement in the report year. Numbers are recorded in the OARS process (Objective Activity RAG Status). This number was substantiated by reference to project 30174 (Customer-requested Lead Pipe Removal) in CIR Q4.

Information on requests originates with the PROMISE customer contact system. Information on replacements made is provided by Network Analysts, who make monthly paper returns, which are totalled for the Annual Return total. Scottish Water notes the need to review its methodology to ensure that requests and resulting works are accurately recorded for future years and is working on an electronic link between PROMISE and Ellipse to this end.

The SR06 was based on an estimated level of customer requests and can now be seen to have been a significant over-estimate.

Line 5 - Number of Water Resource Zones with Reduced Abstraction:

Table G8.5 shows a total of 20 for AR10. This number was substantiated by reference to CIR Q4 and a sample project was checked to confirm actual completion.

Line 6 - Number of Water Sources Provided with Flow Monitoring and Recording

The Table G8 figure of zero was confirmed by reference to CIR Q4.

Lines 7 – 8: These lines were not audited for AR10.

Line 9 - Cross-connections Made Redundant:

To agree the Ministerial Target a desk-top study was carried out to estimate the total number of cross-connections in existence. This was moderated by operational knowledge and sample site visits for the agreement of the SR06 target of 5500. Each year's target is set based on run rate and knowledge of remaining connections. The definition of what constitutes a removal has been agreed with WICS. Contractors are employed in area contracts to either confirm that connections do not exist or decommission them where they do. A progress-tracking spreadsheet is maintained and contractors make weekly returns of work done. The Table G8 figure of 563 was confirmed by reference to CIR Q4.

Line 10 - Number of Sites with Increased Security:

This line was not audited for AR10.

Line 11 Percentage of Population Covered by Water Safety Plans

Scottish Water has set up a programme management office to manage the production of these plans by three consultants. For each plan a desktop study is carried out to review risks and incidents, followed by a site audit covering the catchment and treatment. Risk workshops are held involving external stakeholders to identify risks and quantify likelihood and consequences. Improvement plans are drawn up to manage the most significant risks, including investment projects where appropriate.

The Ministerial Target (50% population coverage) was agreed as part of SR06. The programme for reviews was agreed with DWQR. The populations in each area and in Scotland as a whole were agreed at the start of the Q&S3a period and are not revisited each year. The Table G8 figure of 4.86 million people was confirmed by reference to CIR Q4.

Line 12 – Number of UIDs Improved

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.

Scottish Water maintains a progress monitoring spreadsheet showing cumulative information based on information provided by delivery partners. The Table G8 figure of 102 was confirmed by reference to CIR Q4.

Line 13 WWTW Discharges Improved to Meet New Consent Requirements:

This line was not audited for AR10.

Line 14 – Number of First Time Provision Projects to Meet Environmental Objectives

The Table G8 figure of 2 was confirmed by reference to CIR Q4.

Line 15 – WWTW Discharges Improved to Meet 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. During the year four projects were delivered to meet existing consents. The Table G8 figure of four was confirmed by reference to CIR Q4.

Line 16 – Number of Management and Monitoring Systems at Works to Meet IPPC Regulations:

This line was not audited for AR10.

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 Table G8 figure of 2 was confirmed by reference to CIR Q4.

Lines 18 – 19 – Development Constraints

The reported provision of strategic capacity at water and wastewater treatment works is based on proposed additional capacity at a list of named treatment works. Last year projects for reducing leakage were also included but this year Scottish Water has not put forward any leakage reduction projects specifically to release development constraints. In the examples that we have reviewed acceptance certificates were available to show that the project had been physically completed. As for last year we can confirm that only projects that have physically been completed are used in this year's return.

Capacity is delivered through the completion of identified growth only projects or growth elements built into projects with a quality, or other driver. 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 are now 42,094 p.e for wastewater and 151,000 for water (reduced from a previous change of 174693 reported two years ago) and greatly exceed the original targets. These figures and quarterly targets have been built into Scottish Water's 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 population data and local authority occupancy rates.

Last year we discussed the new targets with Scottish Water and ascertained that they were developed following a review of what is likely to be needed in the period. Last year we stated that we were unsure whether they had been agreed with WICS. We currently understand that the targets have been put in Scottish Water's Delivery Plan, which has been agreed with WICS.

Outputs claimed are either:

- figures from the growth model; or
- the project team estimate.

The basis of the growth model is described fully in our report on the SR10 business plan. The growth model assigns estimates of new developments to 2018 prepared by local councils to treatment works (RAW data). When summed across Scotland these estimates are generally optimistic compared to the national statistics prepared by GROSS. The RAW figures are then moderated within the model to give the "REAL" estimates.

Based on our sample audit it appears that wastewater projects use project team estimates of growth; project teams discuss growth potential with local planning authorities. Water growth only projects have growth potential estimated in the same way. Water quality projects have growth potential estimated from the growth model "real" estimates. Given that the project team estimates appear to be based on local authority data they may suffer from local authority optimism compared to GROSS as evidenced by the difference between the growth model "real" and "raw" figures. We accept that the basis of the growth rates is consistent with the way that Scottish Water is reporting actual development constraints removed.

For wastewater constraints Scottish Water commissioned a study into current constraints of its wastewater treatment works. This study was called the "Development Capacity Assessment Programme" (DCAP). The DCAP programme comprised 3 levels of study: Level 1 – a full load and flow study carried out on big works, Level 2 – 2 weeks of sampling with a desk study and Level 3 – basic site measurement plus information from Scottish Water's corporate systems, carried out on Scottish Water's smaller works. The DCAP study found that many works that previously had been flagged as imposing development constraints in fact had adequate capacity and so the original development constraints could be removed. These were claimed as outputs last year (13,921 outputs out of the 35091 being claimed). We confirm that all outputs claimed this year are as a result of engineering works.

We conclude that outputs claimed this year result from engineering works. However, we remain unsure as to whether the overall targets have been agreed with WICS or are simply an internal target. We also remain unsure as to the basis of the CAPEX1 estimates claimed 2 years ago and whether this results in some double counting over the Q&S3a period.

In columns 60 and 80 of Table G8 current and original targets for the SR06 period are given. This is not consistent with the column headings and we remain unsure as to what is wanted in these columns.

Lines 24 – 26 - Introduction of Competition and Additional Capital Maintenance Allowance:

These lines were not audited for AR10.

Lines 27 – 40 - Leakage and Water Resource Studies:

These lines were not audited for AR10 as the work was completed before the start of the AR10 period.

Lines 41-49 – UID Strategic Studies

We discussed the position with reference to the UID strategic studies with Scottish Water. We reviewed sign off forms where available. On this basis we confirm that:

- All work in the Portobellow catchments is complete.
- Excluding Airdrie and Coatbridge Work Package 1 there is only one remaining output to be completed: 37292 208, Hunter Street. Scottish Water believes that this will be completed by 11/2010. However, we note that the land still has to be purchased. Airdrie and Coatbridge Work Package 1 has been diverted to SR10.
- Meadowhead and Stevenston WP1. This work package comprises 11 outputs. Scottish Water informs us that it has been agreed that this work package can be moved to SR10 and a new end date of March 2012 has been assigned (Autocode 37478)

- Meadowhead and Stevenston WP6. This work package is currently being re-negotiated with the contractor. The work is due to start in August 2010 with a programmed end date of August 2012.

Lines 50 to 54 – Progress with Quality and Standards 3 Sign-off

We reviewed the Q&S3 sign-off process in our audit of AR07 Annual Return. Our comments on the methodology are set out above. During our audit we were able to again confirm our view 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.

Scottish Water's tracker spreadsheet for Q&S3a quality outputs was audited and used to substantiate the data presented in each of the lines G8.50 – 8.54. Six sample projects were reviewed and in every case the signed sign-off sheet was seen.

Confidence Grades

Lines 1 – 49: Confidence grades assigned by Scottish Water for these lines are identical to those assigned in AR09, when they were supported. Given the reporting and approval arrangements in place we believe that the confidence grades reported for actual performance and targets are reasonable.

Lines 50 – 54: Scottish Water has a robust and rigorous procedure for managing and monitoring the sign-off of projects by regulators and the proposed confidence grade of A1 is supported.

8.9 Table G9 – Q&S3 Ministerial Objectives - Serviceability

Commentary by REPORTER

Introduction

Key Points

- We have audited the table data and confirmed consistency with Scottish Water's OARS reports, which includes data reported by the quality regulators, and with other lines in the Annual Report. Sample lines have been reconciled with the base data.

- In most cases reported performance is better than or similar to that reported for AR09. Comparing reported performance with the Delivery Plan target for March 2010, performance on percentage zones compliant for iron and manganese, number of microbiological failures at WTWs, number of properties on the low pressure register, number of properties at risk of internal flooding, number of properties internally flooded due to other causes, number of failing wastewater treatment works and number of pollution incidents are on or better than target. Performance on number of properties with unplanned interruptions of greater than 12 hours, bursts per 1000 Kilometres of mains and number of UIDs remain below target.

- The number of properties with unplanned interruptions of greater than 12 hours remains well above target and was adversely affected by a single large incident at Laburnum Road, Cumbernauld, where 4705 properties had interruptions of 12 to 24 hours. Delays were exacerbated by difficulties in obtaining plant after a burst on a 30 inch diameter trunk main.

- Significant progress has been made in reducing the number of properties on the low pressure register. Reported performance of 2496 is well ahead of the target of 3187. This is due to a continuing programme of pressure logging and investment to remove low-pressure problems. The low-pressure log now no longer holds any historical information on spreadsheet, as this has been investigated by pressure logging during the year and all property numbers are now address-specific. Despite the addition of a significant number of properties due to these investigations a downward trend in numbers has been maintained.

- Reported performance of 217 bursts/1000 km is the same figure as reported at line B8.1. The reported figure represents a worse performance than to the target figure and a deterioration from AR09.

- There has been a further significant improvement in the number of failing wastewater treatment works which at 12 is well below the target of 30.

- UIDs delivered are ahead of target. A number of strategic UIDs have been deferred into the SR10 period.

- The number of pollution incidents has been the subject of a focussed audit, which is reported in a separate section below.

- The post 2009-10 total figure has in every case been stated as identical to the actual March 2010 performance.

- We have concluded that Scottish Water has robust systems in place for monitoring and reporting the delivery of serviceability outputs and that the data reported are consistent with base data and Tables G5 and G6.

Lines G9.1 – G9.10 - Serviceability indicators

Audit Process

During the audit we reviewed:

- The origin of the targets
- Sources of data on Q&S3a serviceability output delivery
- Consistency with Scottish Water's OARS reports
- The methodology for compiling the output table
- Consistency with other lines in the Annual Return, where relevant

We also audited each line of the table to confirm the audit trail back to the base data. The audit was carried out by interviewing members of Scottish Water staff responsible for the compilation of the tables and with direct, unrestricted access to data held on Scottish Water information systems.

Methodology

The Ministerial Target and annual Delivery Plan targets are taken from Scottish Water's Delivery Plan. The reported data on performance are drawn from Scottish Water OARS data, which are also used to compile other lines on serviceability in the Annual Return. OARS is an acronym for the Objective Activity RAG status process. This is a report covering many aspects of operational performance and produced on a monthly basis to allow Scottish Water to monitor and manage these issues.

Information is taken from OARS and downloaded into a spreadsheet for the compilation of Table G9. Data for Table G9 were abstracted from the OARS data report for 31st March 2010. During the audit some minor discrepancies were noted between OARS and data compiled from other systems for other lines in the Annual Return. However these were corrected in time for the final submission.

Scottish Water has agreed with the relevant regulator a guidance document confirming how each serviceability measure will be assessed.

Where necessary, we have commented further on the methodology against the individual lines below. As requested by WICS, we have carried out a focussed audit on pollution incidents, which is separately reported below.

Conclusions

A copy of Scottish Water's January 2009 update of the Delivery Plan was inspected and in every case the Targets stated in Table G9 were seen to be consistent with those given in the Delivery Plan update.

Comparisons with OARS data demonstrated that in every case data in lines G9.1 to G9.11 were consistent with OARS data and where relevant, with other lines in the Annual

Return tables. The reporting of pollution incidents is consistent with the definition introduced for AR08. The number of properties internally flooded due to other causes during the year refers to flooding arising from causes other than hydraulic overloading on main sewers, laterals and private pipes.

Scottish Water has reported identical figures for all lines for the actual March 2010 performance and post 2009-10 total target.

Comments by Line

Lines 1-3: Performance is reported for the 2009 calendar year so the figure reported for March 2010 is actually the figure recorded for December 2009. Information on failures for all three lines comes from LIMS data. Only regulatory samples are used. For lines 1 and 2, a single failed sample in a zone results in a failed zone for that year. Performance has improved for all three lines and in every case is better than or equal to the Delivery Plan target for March 2010.

The methodology for the three lines is similar and only line 1 was audited.

Line 1: For line 1, the figure given of 90.3% is identical to the OARS figure of 90.27% (rounded). OARS data is taken from the water quality OPI turbidity/iron/manganese (TIM) report, which is extracted from LIMS data held in the corporate data register (CDR). The TIM report for December 2009 was checked and also shown to report 90.27%. Base data in LIMS were interrogated for regulatory iron failures during 2009. 49 failures were found, in 32 (90.27%) of the total 329 zones, confirming the reported figure. Sample data are produced by a UKAS-accredited laboratory. Such laboratories are subject to audit by the Drinking Water Quality Regulator. All failures reported are based on real sample data, with no extrapolation. Three failed LIMS samples were checked and seen to be incident-specific.

Line 4: Properties on the low-pressure register were audited as part of our audit of Table B2. Reference should be made to our commentary on Table B2, lines 2 - 10 for our detailed comments. Line G9.4 is identical to line B2.9 and has been reconciled with the base data.

Reported performance of 2496 is well ahead of the target of 3187 and represents a further significant improvement in performance, compared with AR09. This is due to a continuing programme of pressure logging and investment to remove low pressure problems. Initial data on properties affected comes from PROMISE. All reports are investigated and only entered onto the register after logging. The low-pressure log now no longer holds any historical information on spreadsheet, as this has been investigated by pressure logging during the year and all property numbers are now address-specific Despite the addition of a significant number of properties due to these investigations a downward trend in numbers has been maintained.

Line 5: Properties experiencing interruptions to supply were audited as part of our audit of Table B2. Reference should be made to our commentary on Table B2, lines 11 - 25 for our detailed comments. Line G9.5 is identical to the sum of lines B2.17 and B2.24 and has been reconciled with the base data.

Reported performance of 5624 has improved slightly from AR09, although it remains well behind the Delivery Plan target of 1685. The number of unplanned incidents exceeding 12 hours was heavily influenced by a single large incident at Laburnum Road, Cumbernauld, where 4705 properties had interruptions of 12 to 24 hours. Delays were exacerbated by difficulties in obtaining plant after a burst on a 30 inch diameter trunk main.

There has been an additional focus on this performance measure, in part to meet OPA targets. Data originates with customer complaints recorded on PROMISE. 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 has 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 but achievement remains vulnerable to single incidents affecting large numbers of properties.

Line 6: Reported performance of 217 bursts/1000 km is the same figure as reported at line B8.1. Comments on the audit of this figure are included in our commentary on Table B8. The reported figure represents a worse performance than to the target figure and a deterioration from AR09. Bursts are recorded in WAMS, both reported (via PROMISE) and unreported (found through active leakage control). WAMS data distinguishes between the type of pipe affected and guidance notes are used to define these.

Line 7: Properties at risk of internal flooding were audited as part of our audit of Table B3. Reference should be made to our commentary on Table B3, lines 13 - 27 for our detailed comments. Line G9.7 is identical to line B3.15 and has been reconciled with the base data.

Reported performance of 328 is below the Delivery Plan target of 341 for March 2010 and represents a further improvement on the figure for AR09. Significant variation can be expected in the numbers of incidents occurring year on year, as a result of floodings caused by exceptional weather.

After work is carried out to resolve reported problems PROMISE 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 PROMISE 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 was audited in conjunction with our audit of Table B3. Reference should be made to our commentary on Table B3, lines 2 – 12, which also applies here. As part of the audit for those lines, line G9.7 was reconciled with the base data.

This line 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 slightly, compared with AR09 and is below the Delivery Plan target for March 2010 of 1270. Significant variation can be expected in the numbers of incidents occurring year on year. Floodings are investigated as described for line 7 above.

Procedures for recording and investigating internal flooding have been the focus of attention, resulting in improvements and this measure is included in OPA measures. We have audited these procedures and our findings are given in our commentary on Table B3, where we concluded that improvements had been made and supported an improved confidence grade for AR09. 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 of March 2010 based on the regulatory monitoring carried out by SEPA. It includes PPP treatment works. Samples are taken by SEPA on a 'randomised regular' basis and notified automatically to Scottish Water, including the categorisation of pass or failure. Results are reviewed by Scottish Water on a daily basis and recorded in 8 regional registers, which are a mixture of databases and spreadsheets. At the end of each month Scottish Water produces an end-of-month report which is a snapshot of performance at that date. SEPA also produce their own three monthly reports covering single-tier failures, two-tier failures and UWWTD failures, which also define whether a site has failed.

Scottish Water compares internal and SEPA reports and often challenges failures, for example when exceptional circumstances are suspected. Operators meet SEPA on a regular basis to discuss and agree discrepancies, but there is usually a delay of four to six weeks in resolving queries. The March SEPA schedule of failures was reviewed. This showed 13 failures. Three were challenged, following which one was confirmed as a pass, one was confirmed as a failure and one remains undetermined. Scottish Water have therefore reported the worst-case figure of 12 failures, substantiating the figure reported in line 9 and the line is confirmed as being consistent with the base data.

The reported number of 12 is well below the target of 30. 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: This line was not audited in detail, other than checking that the figure given corresponded with OARS data. The number of UIDs has reduced significantly, compared with the AR09 figure, due to investment projects and the completion of studies which means that there are now few new discoveries. The AR10 figure of 827 however remains above the Delivery Plan target for March 2010 of 797. Records of SEPA sign-off are retained. 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.

We are informed that it has been agreed that a number of strategic UIDs in the Meadowhead and Stevenston Catchments can be moved to SR10.

Line 11: For AR10, this line has been the subject of a focussed audit, which is reported in detail in a separate section below. As part of that audit the number of incidents reported was reconciled with the base data. Scottish Water has focussed effort on this area, resulting in an improvement in procedures. The reported figure of 788 is below the Delivery Plan target for March 2010 of 815 and shows a continuing downward trend in the numbers of these incidents.

Comments by Confidence Grade

Lines 1, 3, 8 & 11: These grades are unchanged from AR09, when they were supported.

Line 2: These data are produced by the same methodology as line 1, so we would support a grade of A1, rather than the B3 grade assigned.

Line 4: This grade is consistent with the grade assigned to line B2.9, which we support.

Line 5: This grade is consistent with the grades assigned to lines B2.17 and B2.24, which we support.

Line 6: This grade is consistent with the grade assigned to line E6.19, which we support.

Line 7: This grade is consistent with the grade assigned to line G9.7, which we support.

Line 9: The number quoted includes one failure where status is as yet not agreed so we support the allotted grade of A2.

Line 10: We support the allotted grade of A2.

Line 11: Comments are given in a separate section below.

Line G9.11 – Number of Pollution Incidents

Introduction

As requested by WICS, a focussed audit has been carried out this year on the number of pollution incidents. Our findings are as follows:

Key Points

- The number of pollution incidents is reported against definitions aligned with practice in England and Wales.
- The line definition for this line in the Reporting Requirements is unclear, as it refers to the number of failing wastewater treatment works, whereas this line is used for reporting the number of pollution incidents arising from water treatment and distribution, the sewage network and wastewater and sludge treatment, other than failures of consented continuous discharges.
- Recognising the need to improve data in this area, Scottish Water has recently set up a new team to concentrate on environmental pollution incidents (EPI), which will become part of OPA assessment.
- Pollution incidents are categorised by reference to a categorisation matrix which describes the impact of the incident which was developed by Scottish Water from detailed documentation provided by SEPA.
- The reporting system used means that, in a substantial number of cases, the first report of an incident to SEPA will come from Scottish Water and the reconciliation of the data sources will ensure that no incidents are missed.
- Agreement with SEPA over each incident generally takes a few weeks to achieve. However at the date when the Annual Return was finalised all queries relating to incidents in 2009-10 had been resolved.
- During the audit we reviewed the identification of pollution incidents, the systems on which they are held and the reconciliation between them and the data on incidents.
- By means of sample checks, incidents were confirmed and reconciled with base data. Scottish Water's Annual Return and January – December 2009 totals of pollution incidents were each reconciled with the figures reported by SEPA to WICS.
- We have audited and confirmed the figure of 788 incidents reported at line G9.11. This figure is below the Delivery Plan target figure for March 2010 of 815.
- Scottish Water has put in place measures which will lead to an improvement in data quality and now has robust internal measures for data collection and analysis. However Scottish Water will continue to be reliant on SEPA for information downloads and for the agreement of incident categorisation

- We propose a confidence grade of B2, a significant improvement on the C3 grade allocated for AR09.

Audit Process

During the audit we reviewed:

- The ways in which environmental pollution incidents (EPI) can be identified and reported
- The systems on which data on EPI are held and the transfer of data between them. These include both Scottish Water systems and SEPA's ELMS system
- Data held on PROMISE (Scottish Water's customer contact system), CDR (Scottish Water's corporate data registry) and the spreadsheet which Scottish Water uses to compile and reconcile data on EPI for reporting, which includes downloads from ELMS
- Guidance documentation on the collection and reporting of EPI data
- The methodology for identifying, confirming, notifying, recording and verifying incidents
- The Ministerial and Delivery Plan targets used for comparison
- The numbers held in the EPI spreadsheet and, by means of sample checks, reconciled these with PROMISE, CDR and the ELMS download
- The calculation of the number given at line G9.11
- Sample incidents by reference to the base data
- Scottish Water's Annual Return figure in comparison with the SEPA return to WICS
- The allocation of the confidence grade for line G9.11

The audit trail was followed back to the base data. The audit was carried out by interviewing members of Scottish Water staff responsible for the compilation of the tables and with direct, unrestricted access to data held on Scottish Water information systems.

Methodology

Environmental pollution incidents (EPI) can be reported by the public, SEPA or by Scottish Water staff. Incidents reported by the public are recorded in Scottish Water's customer contact system PROMISE. Operators use a question tree to elicit information from the caller which is recorded in the system. A job is then generated in the work management system and issued to a team using IMS (a handheld device). The team attends the incident and collects information by reference to a checklist. This is phoned in to one of two EPI operators who cover respectively the south & west and north & east of Scotland. The EPI operators ensure that mandatory information is collected and compile an EPI record within the CDR.

The EPI operators inform the EPI coordinator who investigates the incident and carries out root cause analysis, which includes checks with SEPA and on relevant operational activities and may include a site visit if necessary, although this is unusual. The coordinator then updates the CDR records. On notification of an incident the EPI operators also inform Customer Service Delivery (CSD) to arrange for clean-up and any other necessary operational measures, following which CSD inform both EPI operators and SEPA of the outcome. If relevant EPI operators also consult Scottish Water regarding potential trade discharges involved in incidents.

Where the notification of the incident is by SEPA the call is received by PROMISE and dealt with as above. Where the notification is by Scottish Water staff, it is made direct to the EPI operator and then is dealt with as above.

Pollution incidents are categorised when they are received by the EPI telephone operator on the basis of the information provided by the staff on site at the time of the incident. Incidents are categorised as CAT 1, 2, 3, or 4, where CAT 1 is the most serious and CAT 4 is relatively minor. Categorisation is carried out by reference to a categorisation matrix which describes the impact of the incident in 10 categories of environmental, amenity, reputational and social risk, as well as considering the length of watercourse affected. This was developed by Scottish Water from detailed documentation provided by SEPA.

98% of CAT 1, 2 and 3 incidents in 2009-10 were CAT 3. Most of the remainder are CAT 2 and there was only one CAT 1 incident in the year. 62% of incidents arise from the sewerage network. Numbers of CAT 1, 2 & 3 incidents are used to calculate Scottish Water's OPA score for the year.

Three sources of data are used by Scottish Water to provide information on EPI; ELMS (maintained by SEPA), PROMISE and CDR. SEPA provide downloads of ELMS data to Scottish Water, who use this together with data extracted from PROMISE and CDR to update an EPI spreadsheet which is used to reconcile the three sources of data and record agreed categorisations. The reconcilliation process ensures that no incidents are missed. SEPA is also provided with downloads of PROMISE data on incidents.

Delays occasionally arise in the downloading of ELMS data and SEPA have agreed to provide Scottish Water with controlled access to ELMS for data downloading. SEPA and Scottish Water meet on a regular basis to discuss and agree the categorisation of incidents, after which both parties update their own systems. SEPA makes site checks on only a small proportion of incidents. Data originating from ELMS and PROMISE are uploaded after resolution onto CDR which forms a definitive record of incidents. CAR has the capability to store scanned site notes and photos relating to incidents, but this is currently not used.

Scottish Water accepts that some historical records are less accurate but expect that data quality will be improved by the new process. There are currently no guidance manuals on the EPI process, which has only recently been implemented across Scotland. An EPI tracker spreadsheet is used to identify trends and target action on repeat incidents.

Conclusions

The original Ministerial Target of 515 (substantiated from the 2006-10 Delivery Plan) was increased following an increase in incidents under the new definition, aligned with practice in England and Wales, to a March 2008 target of 939 by March 2009. This was based on actual performance at March 2008 (i.e. no deterioration). The current target by March 2010 of 815 was substantiated from the January 2009 Delivery Plan update.

The EPI categorisation spreadsheet is the source of data for Table G9, line 11. The spreadsheet records numbers of incidents on a month-by-month basis. The figure reported at line G9.11 is the total number of incidents occurring in the year April to March. Once agreed, incidents are not removed, for example when preventative measures have been put in place.

Agreement needs to be reached with SEPA over categorisation and other queries for each incident and this generally takes a few weeks to achieve. The resolution of queries will in some cases result in a downgrading of the category. However at the date when the Annual Return was finalised all queries relating to incidents in 2009-10 had been resolved.

We inspected two incident reports held on each of PROMISE, CDR and the ELMS download. The PROMISE incidents held the data originally notified by members of the public and updated with later information. The CAR reports were compiled by EPI operators from telephone reports of incidents and afterwards updated with further information and agreed categorisations. The ELMS downloads contained among other things the date, location, description and SEPA view of the category of the incidents. All of the reports were seen to contain the necessary basic information.

The EPI reconciliation spreadsheet was audited. A summary of the 39 CAT 1, 2 and 3 incidents recorded for October 2009 was reviewed and in the sample of three incidents reviewed in detail (including the only CAT 1 incident in the year) the necessary basic data for identification and categorisation were found.

The reporting system used means that in a substantial number of cases the first report of an incident to SEPA will come from Scottish Water and the reconciliation of the data sources will ensure that no incidents are missed.

The compatibility of the pollution incident returns made by SEPA to WICS and Scottish Water to WICS was reviewed. The SEPA return covers January to December, while the Scottish Water return to WICS covers April to March, so the returns cannot be directly compared. They are however based on compatible data sets, which are reconciled and agreed between SEPA and Scottish Water and so are compatible.

To compare the data sets, we obtained Scottish Water's data on agreed incidents from January to December 2009 and compared this with the SEPA return for the same period. We found that the two data sets were identical and they are in fact reported form the same base data, which are discussed and agreed by Scottish Water and SEPA. .

We have audited and confirmed the figure of 788 incidents reported at line G9.11.

In our opinion Scottish Water has put in place measures which will lead to an improvement in data quality and now has robust internal measures for data collection and analysis. However Scottish Water will continue to be reliant on SEPA for information downloads from ELMS, for the resolution of queries and for the agreement of incident categorisation. These factors introduce delay and uncertainty. In addition the transfer of data between a number of different spreadsheets and databases, including one maintained by SEPA introduces the potential for human error.

Comments on Confidence Grade

Scottish Water proposes a confidence grade of C3. We suggest that a grade of B2 would be appropriate. This is an improvement compared with AR09 and reflects the improvements made in the methods for notifying, verifying and agreeing the status of incidents. The reliability band is influenced by reliance on a number of spreadsheets and databases, including the ELMS database maintained by SEPA. An accuracy band of 2 is however appropriate because the status of all 2009-10 incidents has been confirmed by SEPA.

9. SECTION H: ASSET INVENTORY

9.1 Introduction

Key Points

- For AR10 we have carried out a brief, focussed audit. This concentrated on highlighting changes from the situation reported at AR09 and comprised; brief audit checks to confirm that inventory reported in the H tables corresponds with the data in Scottish Water's Ellipse and GIS systems, checks on changes in asset data, X-factors and the application of cost curves to assets for a small sample of sites, and asset information to facilitate accounting separation. Support Services were not audited.

- There are no changes in methodology or data sources for AR10, compared with AR09. For a detailed discussion of data and methodology for both asset inventory and the MEAV, please refer to our report on AR09, which is not reproduced here, but remains valid.

- Scottish Water has made a complete return of its current asset inventory in Tables H1 to H6. Redundant and decommissioned assets are excluded and only assets operational at the year-end are reported.

- We are satisfied that Scottish Water has sufficient processes in place to ensure consistency of assessment across its business and asset base and to limit the subjectivity of judgements. It should be noted that there is a significant degree of uncertainty in the assessment of the length of laterals and therefore of non-critical sewers, as described below. This is reflected in the low confidence grade for non-critical sewer inventory.

- The return is consistent with those made in previous years. The responsibility for accessing and processing data and compiling the Annual Return tables is concentrated in a single section of the business.

- Changes in inventory are limited to minor improvements arising from investment projects, surveys, CCTV and routine feedback from Customer Service Delivery (CSD) covering changes to assets and their status.

- The inventory data in all lines in Tables H1 to H5 were confirmed by checks back to Ellipse and GIS.

- GIS contains some information on communication pipes, but for inventory purposes the length of communication pipe is calculated on a statistical basis. There is a cost model for communication pipes based on 283 data points. There are no data on supply pipes.

- Specific data exist on the numbers and locations of domestic and non-domestic meters. There is a costing model for non-domestic meters only.

- Scottish Water has limited records of laterals. The quoted length of laterals is based on house types and numbers and a statistical lateral length per property which was derived from two limited samples, one in the town of Wick and one in the surrounding area. The estimated length for AR10 is 16344 km, reduced by 59 km (0.36%) from AR09. Laterals make up 33% of the total estimated sewer stock and 43% of the estimated non-critical sewer stock. The statistical nature of this calculation and the difference in definition of public sewers between Scotland (where laterals are included) and England and Wales (where much pipework in similar locations is not defined as public) casts doubt on the validity of comparisons.

- A nominal length of sewer continues to be added to the inventory to account for lengths believed to exist but not on the inventory. In AR09 1000 km were added. This has been reduced to 650 km for AR10 as it is estimated that 350 km of off-inventory sewer has been identified and added to GIS since 2006. All of the additional 650 km are allocated to non-critical sewers and there is now no off-inventory addition to the length of critical sewers.

- Scottish Water has records of approximately 1350 publicly-owned cess and septic tanks and in the region of 14000 private septic tanks which it has emptied on a commercial basis. There is a cost curve giving cost per cubic metre for public septic tanks only. This covers a range of sizes which are larger than most domestic tanks.

- No sensitivity analysis has been carried out by Scottish Water on the effect of infilling assumptions, for example on mains and sewer depth and material assumptions, or on the potential effect of modifications to cost curves.

- There have been no changes in the methodology for calculating the gross and net MEAV. Scottish Water has once again reported MEAV costs based on the Business Plan set of cost curves. We understand that Scottish Water is preparing revised cost curves, taking in new data based on actual Scottish Water Q&S3a costs and retiring older (pre-EES) data points and data points based on industry standard costs. Scottish Water intends to use these in future MEAV calculations. We welcome this development. This may lead to non-trivial changes in some asset classes which rely on a limited set of curves.

- From our sample audits and calculation checks we are satisfied that cost curves have been correctly applied to assets at unit level and unit-level MEAVs correctly summed to site and asset level to reproduce the data given in the H tables, within the accuracy implied by the confidence grades.

- Changes to the number and type of units on sites recorded in Ellipse continue to be made as a result of surveys.

- A COPI factor of 159 has been applied to AR10 valuations

- There have been no changes to confidence grades compared with AR09, when we accepted the grades allocated by Scottish Water.

Audit Process

The asset inventory was not audited in detail. Support Services were not covered in this audit.

During the audit:

- We confirmed for each table line that no significant changes had taken place in inventory or the method of calculation of gross and net MEAV.

- For those (mainly non-infrastructure) assets where inventory data are held on Ellipse we reviewed the list of sites making up the inventory, confirmed changes to those sites and reconciled those changes to confirm the numbers reported in each line in the H tables.

- For those (mainly infrastructure) assets where inventory data are held on GIS we confirmed the inventory data in Table H by reference to an extract from GIS, to confirm the numbers reported in each line.

- The MEAV for water treatment works is built up by costing all components on a site-by-site basis. Up to 112 components can contribute to the MEAV of a water treatment works site. For three such works, we checked the build up of the Gross MEAV at a unit level, reviewing the appropriateness of the cost curves used and changes in asset numbers, types and X-factors and reproducing the MEAV calculation for comparison with the sum included in the MEAV total for that asset type.

- For clean water pumping and clean water storage the MEAV is calculated based solely on capacity. For three clean water pumping and two clean water storage sites we checked the assessment of capacity and reconciled any changes from AR09 to reproduce the calculation of the site MEAV.

- We also checked the consistency of the MEAV data reported in Table H for non-infrastructure assets with Scottish Water's calculation spreadsheets based on the base data. We did not audit the calculation of Net MEAV.

- We reviewed inventory and cost data available on assets which are particularly relevant to the proposed retail split, i.e:

    - Communication pipes and supply pipes
    - Meters
    - Septic tanks

The audit was carried out by interviewing members of Scottish Water's staff responsible for the compilation of the tables and with direct, unrestricted access to data held on Scottish Water information systems. We also examined specific issues as required by the Reporting Requirements. Our conclusions are given below.

9.2 Comments on Methodology

There have been no changes in the methodology for compiling the asset inventory or calculating the gross and net MEAV compared with those reported for AR09 and reference should be made to our audit report for AR09 for detailed comments on methodology. Scottish Water has once again reported MEAV costs based on the Business Plan set of cost curves. We understand that Scottish Water is preparing revised cost curves, taking in new data based on actual Scottish Water Q&S3a costs and retiring older (pre-EES) data points and data points based on industry standard costs, which it intends to use in future MEAV calculations.

9.3 Conclusions

Inventory

Ellipse Data

Data on most non-infrastructure and some infrastructure assets are held on Ellipse. These are listed below, with the appropriate line numbers from the H tables. For these assets an extract from Ellipse was made using Business Objects. Using this extract we inspected the list of sites making up the inventory for each asset, reviewed changes from AR09 and, on a sample basis, reviewed the change control documentation.

Changes to the inventory were in every case seen to be justified by the change control documentation and consistent with Ellipse and with the relevant table lines. Most changes related to changes in operational status or to new or abandoned assets. For each line the number of assets reported was reconciled with the base data and explained by new sites or abandonments, changes in status or WIC grade. The allocation of numbers of assets to size bands was also verified on a sample basis, where relevant.

The following lines and asset types were inspected in this way:

Table line	Asset type
H 2.1 – H 2.8	Surface water and groundwater treatment works
H 2.9 – H 2.10	Service reservoirs and water towers
H 2.11 – H 2.13	Water pumping stations
H 3.1	Dams and impounding reservoirs
H 3.2	Raw water intakes
H 3.8	Water meters
H 5.1 – H 5.2	Sewage pumping stations
H 5.3 – H 5.7	Sewage treatment works
H 5.8 - H 5.13	Sludge treatment facilities

As in previous years there is significant infilling of capacity data for dams and reservoirs (approximately 25%) and for pumping stations.

Data on domestic and non-domestic water meters was checked directly on Ellipse and the numbers reported in size band 0 (non-domestic) and size band 1 were substantiated. No change control documentation was available.

GIS Data

Data on most infrastructure assets are held on GIS. These are listed below, with the appropriate line numbers from the H tables. For these assets an extract from GIS was made using GIS Tools. Using this extract we substantiated the numbers and lengths of assets reported in the table for each asset type. Change control documentation was not inspected, although previous audits have shown that this is generally available for assets recorded on GIS. Procedures for updating GIS were covered in our report for AR09.

In every case the totals reported in the table lines were seen to be consistent with GIS.

The following lines and asset types were inspected in this way:

Table line	Asset type
H 3.3	Raw water aqueducts
H 3.4 – H 3.5	Water mains
H 3.6 – H 3.7	Communication pipes
H 4.1 – H 4.3	Sewers and rising mains
H 4.4 – H 4.5	Sewer structures
H 4.6 – H 4.7	Sea outfalls

From the checks described above we are satisfied that inventory data given in Tables H1 to H5 are consistent with Scottish Water's base data held in the Ellipse and GIS systems.

There continues to be significant infilling of data on mains and sewer material, diameter and surface type. A small amount of data improvement has resulted from information forthcoming from work carried out on the network and from CCTV. Infilling assumptions are unchanged from AR09 and no sensitivity analysis has been carried out on the effect of those assumptions.

A nominal length of sewer continues to be added to the inventory to account for lengths believed to exist but not on the inventory. In AR09 1000 km were added. This has been reduced to 650 km for AR10 as it is estimated that 350 km of off-inventory sewer has been identified and added to GIS since 2006. All of the additional 650 km are allocated to non-critical sewers and there is now no off-inventory addition to the length of critical sewers.

Inventory data on laterals continues to be added on a statistical basis as in previous years. This is based on house types and numbers and a statistical lateral length per property which was derived from a very limited sample in the town of Wick. The estimated length for AR10 is 16344 km, reduced by 59 km (0.36%) from AR09. Laterals make up 33% of the total estimated sewer stock and 43% of the estimated non-critical sewer stock. The statistical nature of this calculation and the difference in definition of public sewers between Scotland (where laterals are included) and England and Wales (where much pipework in similar locations is not defined as public) casts doubt on the validity of comparisons.

Data on outfall lengths is held in a separate Governance, Information and Value database. This was not audited.

Calculation of MEAV

There have been no changes in the methodology for the calculation of the MEAV, compared with AR09. The Business Plan cost curves have once again been used in the calculation of Gross MEAV. The MEAV has been recalculated for all assets to take into account changes in inventory, on-costs and COPI.

A COPI factor of 159 has been used for AR10 valuations, a reduction from the 162 figure used for AR09. On-costs were not audited.

The following table summarises changes in MEAV between AR09 and AR10 for the main asset types:

Line Ref.	Asset Type	AR09 Gross MEAV (£m)	AR09 % of total	AR10 Gross MEAV (£m)	AR10% Of total	Change (£m)	% Change AR09 to AR10
H1.1	Water treatment works	2256.36	5.15%	2199.80	5.11%	-56.565	-2.51
H1.2	Water storage	1309.21	2.99%	1287.09	2.99%	-22.116	-1.69
H1.3	Water pumping stations	404.64	0.92%	465.56	1.08%	60.920	15.06
H1.4	Water resources	2603.34	5.94%	2493.67	5.79%	-109.670	-4.21
H1.5	Water mains	9513.22	21.71%	9308.32	21.63%	-204.900	-2.15
H1.6	Sewers	23238.10	53.02%	22737.59	52.83%	-500.509	-2.15
H1.7	Sewer structures	336.54	0.77%	381.23	0.89%	44.685	13.28
H1.8	Sea outfalls	576.32	1.31%	576.32	1.34%	-0.003	0.00
H1.9	Sewage pumping stations	798.90	1.82%	794.64	1.85%	-4.258	-0.53
H1.10	Sewage treatment works	2504.41	5.71%	2510.13	5.83%	5.724	0.23
H1.11	Sludge treatment facilities	105.09	0.24%	115.44	0.27%	10.353	9.85
H1.12	Support services	183.19	0.0042	170.805	0.004	-12.385	-6.76
	Total	**43829.32**	**100%**	**43040.60**	**100%**	**-788.723**	**-1.80**

From this comparison, it can be seen that there were material increases in MEAV for:

- Water pumping stations, where MEAV increased by 15% while the inventory increased by 3%
- Sewer structures, where MEAV increased by 13%, while the inventory decreased by 1%
- Sludge treatment facilities, where MEAV increased by 10%, while the inventory increased by 9%

Other changes were generally not material. Prior to our audit we compared gross MEAVs by site noting changes between 2009 and 2010. In particular we noted:

- Significant positive and negative changes in a limited number of assets that did not appear to be explained by new assets commissioned or old assets decommissioned;
- That while changes in most assets were close to the changes indicated by COPI they were generally lower than the –1.85% figure indicated by the reduction in COPI from 162 to 159

We reviewed these points with Scottish Water and also reviewed data provided on 8 water treatment, water storage and water pumping sites which showed large positive and negative percentage changes in MEAV, compared with AR09. We came to the following conclusions:

- The large movements in MEAV for the selected sites were caused by changes to the numbers and types of assets recorded at unit level following surveys, new construction or demolition or to changes in X-factors.

- The trend for a reduction in MEAV of around but not exactly 1.85% for sites where there were no changes in assets or X-factors (descriptor used in the cost curves such as peak flow or building area) was due to the fact that for some kinds of site-specific on-costs COPI updating is not applied, or is proportionally applied.

- There have been no changes in the cost curves used for any assets compared with AR09

- Within the sample of sites audited, which was small (0.125% of the total of approximately 6400 non-infrastructure sites) and biased towards sites showing large movements in MEAV from AR09 to AR10, there were changes to data on asset type, number or X-factor following surveys or information from operators at 5 out of 8 sites.

Based on the very small sample of water treatment works, service reservoirs and clean water pumping stations we are satisfied that:

- Changes in asset numbers, types and X-factors from AR09 have been substantiated.

- The correct cost algorithms have been applied.

- COPI has been correctly applied (having a negative influence on MEAV, compared with AR09).

- Process level totals have been correctly summed to give the site total MEAV.

Based on our checks on Scottish Water's MEAV calculation database as a whole, we are satisfied that:

- Site MEAVs have been correctly totalled to give the total MEAV for the asset type.

- The gross MEAV totals reported in the H Tables are consistent with Scottish Water's calculations based on the base asset data.

We noted that two treated water storage and two treated water pumping sites had been omitted from the list of sites valued for MEAV purposes due to data errors whereby tanks or pumps were missing from the site data at unit level. The effect of these omissions on the overall MEAV calculation for these asset types is negligible.

During the audit we discussed with Scottish Water the fact that changes in asset data and X-factor are still being made due to discoveries made during site surveys. This is not believed to be a widespread trend. Scottish Water is aware of this issue and has set aside funding in the current regulatory period to improve regulatory reporting, including data accuracy. Asset Planners in Asset Investment Management (AIM) own asset data and Governance, Information and Value (GIV) manage the systems in which it is held. Routines for requesting data checks are being formalised and joint AIM/GIV workshops have taken place to identify priority areas for data improvement, checking routines and links to investment projects.

It is Scottish Water's view that asset data continues to improve and that data which are in error or missing are moving from site to unit level as a result. Data improvement effort is planned to concentrate first on completing missing data to reduce the percentage of extrapolated data and then on checking all data held, in an agreed priority order.

During the audit we also discussed revised cost curves which Scottish Water is in the process of preparing, taking into account new data based on actual Scottish Water Q&S3a costs and retiring older (pre-EES) data points and data points based on industry standard costs. In building up these revised cost curves, all new cost data points will be reviewed to ensure content is consistent with the relevant cost curve before being used, with unrepresentative data points being rejected. A minimum of 5 data points will be required before a curve will be used for estimating purposes. Data points will be taken from actual project data, with costs split down between asset types after the removal of general costs.

Scottish Water intends to use these revised cost curves in future MEAV calculations. We welcome this development. In our view these new curves have the potential to provide more accurate MEAV values than the curves currently in use. The accuracy of cost curves is however dependent on the number of data points available, particularly for larger capacities. Scottish Water continues to collect cost data points and proposes to move to collecting these data at Capex 5 stage, when outturn costs are known, rather than the current Capex 3 stage.

Scottish Water has not carried out any sensitivity analysis on its cost curves, but proposes to continue to collect additional data points, to review and exclude inappropriate cost data and to develop more specific cost curves for certain asset types.

Accounting Separation

Scottish Water's asset inventory and cost estimating systems contain the following information on asset numbers and the calculation of MEAV which are relevant to the proposed retail and accounting split:

Communication Pipes

Inventory - All communication pipe data used in the H tables is inferred. The number of communication pipes is calculated from numbers of properties of different types, applying rules on numbers of pipes derived from surveys relating to different property types, including stacked properties. The communication pipe material is also inferred from the property age. The length of pipes is not currently estimated, although this could be done from Ordnance Survey data. GIS contains some limited real data on communication pipes but these are not used in the preparation of H tables.

Calculation of MEAV – Scottish Water's cost model for communication pipes is based on 283 data points derived from work done by its own staff or contractors. Costs appear in some cases to include for the removal of the old pipe where a communication pipe is renewed. Costs include excavation, backfill and the boundary box.

Supply Pipes

Inventory - Scottish Water's records contain no information on supply pipes as these are not public assets. It is possible that numbers could be inferred from the GIS as a logical link from the property address point to the boundary box or nearest main.

Calculation of MEAV – Scottish Water has no cost model for supply pipes.

Meters

Inventory - Scottish Water records only 615 domestic meters. Information is held in billing records and we confirmed that an address is held for each meter, which is used for billing purposes. This number differs from that reported in the A and P tables, which reflect different billing arrangements. Meter diameter is not recorded but is assumed to be in the range 15-20 millimetres. The number of non-domestic meters is much larger (134541). Data, which are held in Ellipse, are mainly address specific and include information on diameter. This was substantiated by checks on Ellipse data.

Calculation of MEAV – Scottish Water has cost information for a range of meter diameters. These are derived from its own costs in installing non-domestic meters. The base data were inspected and were seen to consist of costs for each of the four old Scottish Water regions, averaged out to give a Scotland-wide cost for various diameters. The cost includes for a survey, the purchase and installation of the meter, including the chamber.

Septic Tanks

Inventory - Line H5.3 records 1231 publicly-owned cess and septic tanks but the line definition excludes cess or septic tanks which are preceded by screens or grit removal or followed by further treatment. These are included in other lines in the table. The total number of cess and septic tanks in Scottish Water ownership was not precisely established, but is in the region of 1350. Public septic tanks are all treated as WWTWs and are recorded in Ellipse with location by address point and OS grid reference and including the size and other operational data.

Scottish Water also has records of some private septic tanks which it has emptied on a commercial basis. These records include ownership, address and size. Owing to changes in ownership it is not straightforward to establish the number and this was not precisely done. It is however estimated that Scottish Water emptied approximately 14000 of these during 2009-10.

Calculation of MEAV – Scottish Water has a cost curve giving cost per cubic metre for septic tanks based on 15 data points for tanks in the range 38 – 320 cubic metres. These data are based on public septic tanks only and the range of sizes covered by the data is larger than most domestic tanks. Costs refer to the cost of the tank only and do not include pipework.

9.4 Comments by Line

Our comments on individual lines are included in Conclusions above.

9.5 Confidence Grades

There have been no changes to confidence grades for either inventory or the calculation of MEAV, compared to those reported for AR09, which we accepted at that time.

10. SECTION K: INVESTMENT PLAN

Commentary by REPORTER

10.1 Introduction

Key Points

The K tables are based on Scottish Water's Delivery Plan for Q&S3b and the CIR Q3 2009/10 for Q&S2 and 3a. Because CIR Q3 2009/10 has been used the figures will not reconcile completely with the G tables which use the CIR Q4 2009/10.

Q&S3b is consistent with the Delivery Plan.

The total expenditure of £2576.5M in Table K1 reconciles to within £0.3M of Table 8.4 in the delivery plan when the latter is adjusted to 2007/8 prices.

Scottish Water maintains a detailed analysis of costs by project, asset and driver which forms the basis of cost allocation to the K tables. For Q&S3b Scottish Water has developed the database which was used as the basis of the business plan Table C to provide the detail first for the Delivery Plan and now the K tables. During our sample audit we were able to understand the development of the database. For the enhancement programme, additions and subtractions can generally be reconciled to signed off OMG change forms. Scottish Water has made significant changes in the detail of its capital maintenance programme and the clarity of the changes are not available in the same way as those for the enhancement programme. However, we believe that the final K table data is consistent with the high level changes agreed with WICS in the final determination.

Our sample audit indicated that Q&S2 and 3a were consistent with CIR Q3 2009/10.

The grants and contributions in Table K1 are limited to the infrastructure charges from development and £6M as shown in the Delivery Plan. The infrastructure charges are what Scottish Water expects to spend on its Part3 assets and not the total revenue it expects to receive; Scottish Water reports that this is consistent with the assumptions made in the final determination.

The capital expenditure reported is gross expenditure before deduction of grants and contributions.

Grants and contributions, which represent income, are entered in Table K1 as positive values.

Projects with more than one driver have outputs recorded against each driver in Table K2. Some outputs cannot be directly reconciled between tables K2 and K4 as they are programmes of works.

Scope of the audit

Scottish Water has developed large and complex databases to provide the data for the K tables. Within the time available for our audit we were unable to audit the overall databases and analysis spreadsheets in any detail. We have therefore focussed our audit:

- On understanding the methodology used by Scottish Water.

- Following the audit trail of new projects from Scottish Water's response to the draft determination through to the K tables.

- Reviewing a very small number of drivers to see how projects have been carried through to the K tables from the business plan and how expenditure has been modified either by stretched efficiency targets or by negotiated values.

- Reviewing the projects making up a very small number of drivers in the Q&S2 and Q&S3a programmes to check consistency with the Q3 2009 CIR.

- Reviewing high level changes to autocodes. We attempted to follow audit trails by comparing project autocodes developed for the business plan with those in the database for the K tables. While many could be compared directly there were a very significant number of changes to autocodes including:

  Many new capital maintenance disaggregations and new projects
  New notional Q&S4 early start schemes
  New growth schemes
  Transfers of swabbing from DW5 to capital maintenance, as per the final determination
  Disaggregations of drivers WQ01A and B

  Within the time available to us we were not able to audit these many detailed changes in any detail.

While limited, we believe that the scope of our audit, undertaken over a two day period, was sufficient to allow us to conclude that Scottish Water had developed the K tables in a thorough manner and that, where relevant, projects developed for the business plan and new projects had been carried through to the K tables. Throughout our audits Scottish Water were able to demonstrate that its work had been properly done.

10.2 Scottish Water's methodology for preparing the K tables

General

Scottish Water has developed the K tables separately for the Q&S3b capital programme and the Q&S2 and 3a programme overhang. Costs incurred in 2009/10 are included in Q&S3b projects as this expenditure forms part of the agreed programme. Capital maintenance and growth projects have been subject to the "guillotine" on March 31st 2015 as agreed with WICS. Non capital maintenance projects include any expenditure programmed to occur after March 31st 2015, but currently this is restricted to one trivial item.

The Q&S2 and Q&S3a programme overhang

The Q&S2 and Q&S3a overhang has been derived from the same download from Scottish Water's capital management system, CIMS, which was used to derive the Q3 2009/10 CIR. The CIR could not be used directly to prepare entries to the K tables because the codes needed for cost allocation to drivers and lines and detailed allocation into years are not included in the CIR submission.

Within the CIMS download Scottish Water identified all projects that had achieved beneficial use, or where applicable, regulatory sign-off, and acting on WICS instructions has "rolled them up" assigning new programme descriptions and autocodes. This was also done where a named project had more than 5 drivers. Projects have also had to be disaggregated into different drivers for the lines of Table K1 and then rolled up into the line. This has been done using separate spreadsheets for each line or grouping and has required significant work which could be subject to error. However, we believe that Scottish Water has made every effort to minimise errors and good correlation of the totals of tables K1 and K4 give confidence that the work has been done well.

The above method means that Table K1 has not been derived directly from Table K4 but both tables have been derived from the same CIMS download.

The Q&S3b (SR10 programme)

Projects within the Q&S3b programme have been recorded in an Oracle database and then downloaded in the K tables. As for the Q&S2 and Q&S3a overhangs tables K1 to K3 have not been developed directly from Table K4 but rather all the tables have been derived from the common database.

The database has been derived directly from the original business plan projects database, developing the database over the period since the submission of the 2nd DBP through various submissions and discussions comprising:

- The draft determination.
- Scottish Water's response to the draft determination in September 2009.
- The final determination of November 2009.
- Scottish Water's delivery plan of February 2010.

During this process it was agreed that a 5th year would be added to the programme and Scottish Water's capital maintenance programme would be set at £220M per annum (plus a one off special item). The inclusion of a 5th year allowed WICS, DWQR, SEPA and the Scottish Government to allocate additional, previously identified, projects to the programme from the "desirable programme" of the business plan. These enhancement programme projects were subject to formal signoff by the various stakeholders and, with the various documents in the list above, form a useful audit trail back to the business plan. The details of the capital maintenance programme are less well defined and it is difficult to identify the various changes in detailed capital maintenance projects from the business plan to the K tables.

For Q&S3b projects, profiles for key milestone dates with corresponding expenditure profiles covering the construction of different asset types were derived for the business plan. These were used for many of the new projects. Where the expenditure has only been recorded at a programme level, expenditure profiles have been derived in discussion between those developing the K tables and programme managers. Where there has already been expenditure against a project this has been downloaded into the database and incorporated into the expenditure profiles. The profiling methodology uses the same timescale templates as was used for the creation of Table C and the outputs profile at M5 matches that shown in Table 10.7 of the Delivery plan. We commented on the derivation of timescale templates in our comments on the Final Business Plan.

Many of the post efficiency expenditures that were derived for the business plan have been amended as follows:

- Revised "stretch" efficiency reductions have been derived following the final determination. Generally a standard adjustment has been used but in some cases Scottish Water has taken a view that a project specific efficiency adjustment would be more appropriate.

- Many projects have already been subject to negotiation with Scottish Water's Delivery Vehicles (Scottish Water Solutions 2 (SWS2)) and where they have been accepted by Scottish Water these have been used in place of the adjusted post efficiency values.

The development of the database has been the responsibility of the same person who developed the database for the business plan. We were impressed by the thoroughness of the work done for the business plan and we believe that the same care and attention to detail has been put into the development of the K tables.

10.3 Other general comments

Generally all reductions in scope suggested by WICS in the Determination have been accepted by Scottish Water.

Capital maintenance and growth lines have been "guillotined" as per WICS view that these programmes are on-going over business plan periods.

We believe that Q&S3b is consistent with the Delivery Plan. We were able to audit most new projects developed during negotiations with WICS through to the K tables.

The total expenditure of £2576.5M in Table K1 reconciles to within £0.3M with the total of £2516M in the Delivery Plan when the latter is adjusted to 2007/8 prices.

Scottish Water maintains a detailed analysis of costs by project, asset and driver which forms the basis of cost allocation to the K tables. For Q&S3b Scottish Water has developed the database which was used as the basis of the business plan Table C to provide the detail, first for the Delivery Plan and now the K tables. During our sample audit we were able to understand the development of the database. For the enhancement programme additions and subtractions can be reconciled to signed off OMG change forms. Scottish Water has made significant changes in the detail of its capital maintenance programme and clarity of the changes are not available in the same way as those for the enhancement programme. However, we believe that the final K table data is consistent with the high level changes agreed with WICS in the final determination.

Our sample audit indicated that the Q&S2 and 3a lines in Table K1 were consistent with the CIR Q3 2009/10.

When developing the Delivery Plan and the K tables Scottish Water updated the project costs either by applying a stretched efficiency or, if a cost had been negotiated with SWS2, the negotiated price. Projects that would be developed through the 7 stage process do not have further efficiency applied to them.

The capital expenditure reported is gross expenditure before deduction of grants and contributions.

The grants and contributions in Table K1 are limited to the infrastructure charges from development and £6M (£6.093M at 2007/8 prices) as shown in the Delivery Plan. The £6.093M has been added to 2 capital maintenance rolled up lines (autocodes 45680 and 45729; they are also shown in the relevant column of Table K4). The Infrastructure Charges are projected spend that Scottish Water expects to incur on its Part 3 assets. The actual revenue that Scottish Water will receive from its infrastructure charges will be significantly more.

Grants and contributions, which represent income, are entered in Table as positive values.

Projects with more than one driver have outputs recorded against each driver in Table K2. Some outputs cannot be directly reconciled between tables K2 and K4 as they are programmes of works.

10.4 Comments by Line

We have not provided commentary by line for this table.

10.5 Comments by Confidence Grade

Scottish Water has ascribed a confidence grade of A3 to the K tables. When considered at a programme level we believe this to be reasonable. Variability in individual projects will be greater.

Appendix A

The Reporter's team

APPENDIX A: THE REPORTER'S TEAM

General

The Annual Return 2010 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 and other professionals. 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 an 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 K tables, certain parts of the G and E tables and certain parts of the OPA submission.

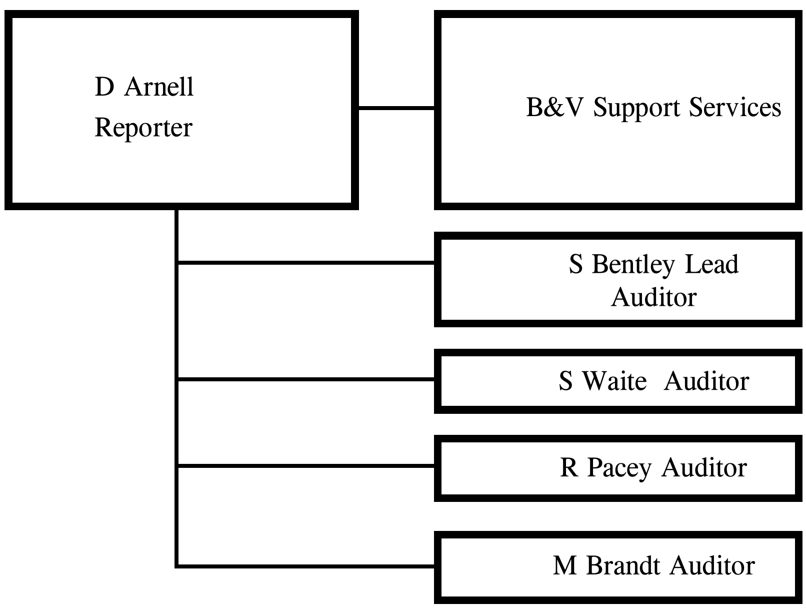


Figure A.1 Structure of the Reporter's Team

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 asset related levels of service (water pressure, interruptions to supply and flooding), the asset inventory and the capital programme

Ms S Waite, Auditor: Ms Waite is a consultant to Black & Veatch. Ms Waite reviewed work on operating costs.

Mr R Pacey, Auditor: Mr Pacey is a consultant with Black & Veatch. Mr Pacey undertook reviews on sewerage outputs, 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 Annual 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
22/04/10	Watermark House	AD, NA, ME, DA	DA/1: K tables
26/04/10	Fairmilehead Office	IT, BH, JS, CE, MR, JW, DA	DA/2: Tables B4 & B7 Customer Services
27/04/10	Fairmilehead Office	DB, IT, DA	DA/3 Table B4, telephone contacts
27/4/10	Fairmilehead Office	IT, DA	DA/4: Table B4, payment method enquiries
28/04/10	Balmour Road Office	LD, IT, SM, DA	DA/5: Table B7 GMS payments
4/5/10	Fairmilehead Office	IT, KM, DB, DA	DA/6: Table B4 appointments
4/05/10	Castle House	PH, DA	DA/7: Table E1 Infrastructure depreciation charge
5/5/10	Castle House	TH, EM, DA	DA/8: Allocations in CIMS and CISP
5/5/10	Castle House	AD, ME, DA	DA/9: K tables
6/05/10	Castle House	LC, DA	DA/10: New obligations
6/05/10	Castle House	GW, DA	DA/11: Tables G5 & 6, Investment plan risk items
6/5/10	Castle House	BMG, DA	DA/12: Governance
7/05/10	Castle House	GW, TH, DA	DA/13: Tables G5 & 6, Investment plan risk items follow up
7/5/10	Castle House	NB, AC, BN, DA	DA/14: UID Strategic Studies
7/5/10	Castle House	NB, KD, DA	DA/15: Development Constraints
26/5/09	Fairmilehead Office	BO, DA	DA/16: Audit Committee
23/04/10	Fairmilehead Office	BB, KM, JM, PL, DM, DC, JH, TB, MB	MB/1: Water Balance for OPA and A tables
04- 05/05/10	Fairmilehead Office	BB, KM, MW, RH, CM, JH, JR, RL, TB, MB	MB/1: Water Balance for OPA and A tables
10-12/05/09	Fairmilehead Office	PH, F McI, LJ, RL, TB, IR, GS, MB	MB/2: A1, A2, and part E6, E7 and H Tables
13/01/09	Juniper House	RS, IC, CC, WR, PR, CJ, MB	MB/3: SoSI calculation and B tables
26/04/2010	Castle House	GH, RP	RP/26: Table B8.1, E6.19 Mains bursts
27/04/2010	Castle House	SB, MR, RP	RP/28: Table B8.11 Sewer collapses
27/04/2010	Castle House	PD, DR, AM , RP	RP/36 & 37: Tables D5, D6, Infrastructure asset balance & CCTV
28/04/2010	Castle House	MR, KM, RP	RP/28: Table B8.16 Sewer blockages
28/04/2010	Castle House	JS, AM, DS, RP	RP/34 Tables D5.1 to D5.11, D1.17 to D1.21 D1.45 to D1.51 Water mains asset balance
28/04/2010	Castle House	JS, AM, DS, RP	RP/37 Tables D6.1 to D6.3, D6.5 to D6.13, D2.1 to D2.3, D2.31 to D2.33 Sewerage asset balance
29/04/2010	Castle House	ST, RP	RP/48 Table E6.5 & 6 Water supply zones
04/05/2010	Castle House	AMcD, BW, RP	RP/13 Table B4.30 to 40 Private septic tanks
05/05/2010	Castle House	GS, RP	RP/55 E10.1 & 2 Sludge treatment disposal
05/05/2010	Castle House	GS, RP	RP/14 Tables A2.46 t0 A2.51, A2.55 to A2.59, E7.24, E7.25, E9.1, E9.8 to 14 Sewage loads
10/05/2010	Castle House	GS, RP	RP/50, 53, 54, 55 Tables E7, E8, E10 Drained areas, wastewater assets, sludge
10/05/2010	Castle House	GM, PD, RP	RP/47 Tables E4.13, E4.14, E6.25, E7.17 Peak demand and pumping head

Date	Location	Personnel	Subject
11/05/2010	Castle House	DM, GS, RP	RP/15 Tables A2.61, A2.62 E10.1, E10.2 Sewage sludge
11/05/2010	Castle House	DM, GS, RP	RP/55 Table E10.1, E10.2 Sewage sludge
11/05/2010	Castle House	GS, RP	RP/54 Tables E8.1 to E8.10, E9.1 toE9.14 WwTW numbers and loads
12/05/2010	Castle House	RL, TB, RP	RP/9 Table A1.23 to A1.29 Surface and road drainage
13/05/2010	Castle House	RS, RP	RP/10 & 11 Tables A1.36 to A1.39, A2.43, A2.50, E8, E9, P17, P28, P29, Trade effluent
19/4/10	Watermark House	SEB, DB, TH, DL, SBo	SEB/1 Killylour WTW Upgrade and Strategic Solution, Risk Management Holding Code, UIDs Holding Code, Water Resources Holding Code
20/4/10	Watermark House	SEB, EG, SBo, RW, JM	SEB/2 UID 130m E of 1 Gilmore Close
20/4/10	Watermark House	SEB, SBo, JF, AB, EG	SEB/3 NRSWA Service Relocation – Edinburgh Tram
20/4/10	Watermark House	SEB, SBo, DL, AC, AM	SEB/4 Newton Stewart WWTP & PS Remedial & Strategic Growth
20/4/10	Watermark House	SEB, DL, SBo	SEB/5 Killylour WTW Upgrade
21/4/10	Watermark House	SEB, EG, EC, KI, RMcL	SEB/6 Invercannie & Mannofield WRZ/WFD
21/4/10	Watermark House	SEB, SBo, RMcL, EG, EC, KI	SEB/7 WRSS Controls on Abstraction and Impoundment
21/4/10	Watermark House	SEB, SBo, GD, MP, RB	SEB/8 Perth WWTW Odour Control
21/4/10	Watermark House	SEB, SBo, DH	SEB/9 Dalscone WWTW Capital Maintenance & Growth
22/4/10	Watermark House	SEB, SBo, EG, JR, AG, RW	SEB/10 UID WP6.1 Kilmarnock Gravity Transfer
22/4/10	Watermark House	SEB, SBo, EG, EB, KH, IMcM, GS	SEB/11 Campbeltown WWTW quality Phase 5 Work Package 2
22/4/10	Watermark House	SEB, EG, KI, NB, CJ, PF, AC	SEB/12 UID Cumbernauld uSWO
22/4/10	Watermark House	SEB, BM	SEB/13 UID WP6.1 Kilmarnock Gravity Transfer
23/4/10	Watermark House	SEB, RB	SEB/14 Breadth of Output Codes, Killylour WTW, Invercannie and Mannofield WRZ/WFD
26/4/10	Castle House	SEB, KM, GH, LC	SEB/15 Sewage Flooding
26/4/10	Castle House	SEB, ST, AMcK	SEB/16 Flooding At-risk Register
27/4/10	Castle House	SEB, AJ, MP	SEB/17 Interruptions to Supply
28/4/10	Castle House	SEB, CL, MP	SEB/18 Low Pressure
29/4/10	Castle House	SEB, LJ, GI, PD, DS, SH, JS, PR	SEB/19 Asset Inventory
30/4/10	Castle House	SEB, SC-L, BMcG, PM	SEB/20 Pollution Incidents
4/5/10	Castle House	SEB, IP	SEB/21 Table G9
5/5/10	Castle House	SEB, IP	SEB/22 Table G8
5/5/10	Castle House	SEB, BMcC	SEB/23 Zones Compliant for Iron
5/5/10	Castle House	SEB, IP	SEB/24 Table G7
6/5/10	Castle House	SEB, IP, SC	SEB/25 WIC 16 Progress, Q&S2 Sign-off
7/5/10	Castle House	SEB, IP, MW, MF	SEB/26 G Table Transfers
7/5/10	Castle House	SEB, MW, MF	SEB/27 Reconciliation of Opex
10/5/10	Henderson Drive	SEB, SBo, TM, AMacK, H	SEB/28 Loch Leven Cluster

Date	Location	Personnel	Subject
		McP, GC	
10/5/10	Henderson Drive	SEB, SBo, AMacK, TM, GL	SEB/29 Blackpark WTW
11/5/10	Castle House	SEB, PH	SEB/30 Grants and Contributions
11/5/10	Castle House	SEB, MW	SEB/31 Grants and Contributions
11/5/10	Castle House	SEB, MW	SEB/32 Reconciliation of Opex
11/5/10	Castle House	SEB, MW	SEB/33 Reconciliation of Table G6/K56
12/5/10	Castle House	SEB, IS, PD, LJ, SH	SEB 34 MEAV
12/5/10	Castle House	SEB, GMcL, EM	SEB/35 WQ Licences, Odour, IPPC Licences
13/5/10	Castle House	SEB, IP	SEB/36 Tables D7, D8
13/5/10	Castle House	SEB, SW	SEB/37 Failing WWTW
13/5/10	Castle House	SEB, MW, MF, AM	SEB/38 Tables D1, D2, D3
23/6/10	Castle House	SEB, SH, PD, IS, LM	SEB/39 MEAV
24/6/10	Castle House	SEB, PD	SEB/40 Asset Inventory
05/05/2010	Dundee	ST, DF, SW	SW/1 Overview to Section E
05/05/2010	Dundee	DF,SW	SW/2 ABM Cost Allocation
05/05/2010	Dundee	LC, RW, SW	SW/3 Tay Region Operational Audit Waste
06/05/2010	Dundee	LC, CN, SW	SW/4 Tay Region Operational Audit Water
06/05/2010	Dundee	DF,SW	SW/5 E Tables
07/05/2010	Dundee	MA, JM,GB,SW	SW/6 Clyde Region Operational Audit Networks

Reporter's team

DA	David Arnell, Reporter	RP	Roger Pacey
SW	Sally Waite	MB	Malcolm Brandt
SB	Steve Bentley		

Company and Supplier staff

	D Arnell's meetings		
BO	Belinda Oldfield	BMG	Brian McGrath
AD	Andy Dunbar	PD	Peter Douglas
NA	Norrie Adams	ME	Margaret Evans
BH	Brian Hunter	JS	Jackie Sutherland
IT	Ian Turpie	CH	Celia Hunter
MR	Martin Reilly	JW	Julie Walter
DB	David Buchanan	LD	Lorraine Dutch
AM	Sara Macullum	KM	Kevin Mair
DB	Dmpna Boyd	PH	Peter Haddow
TH	Tom Hedley	EM	Ewan Mattheys
LC	Lesley Cameron	GW	Gavin Ward
BN	Brian Nicholl	NB	Norrie Butter
KD	Kirk Daniels	AC	Alan Coulter
	M Brandt's meetings		
TB	Tommy Brown	PL	Patrick Lynn
TB	Tim Brus	JM	Jonathan Mallon (ZTech Control Systems)
BB	Bill Brydon	DM	Daniel McIntosh
IC	Iain Cambell	LM	Lindsey McMillan

DC	Douglas Cassels	KM	Kenny Milligan
CC	Claire Cochrane	CM	Craig Murray
CC	Colin Collier	WR	Bill Reekie
PC	Phil Chilvers	JR	John Robertson (RPS)
JH	Julia Haythornthwaite	PR	Paul Rogers
RH	Richard Hill	IR	Ian Russell
LJ	Linda Jack	GS	Gordon Stenhouse
CJ	Caroline Jones	RS	Robert Stewart
RL	Richard Lavery	MW	Martin Walton
	R Pacey's meetings		
AMcD	Alison McDougal	GS	Gordon Stenhouse
AMcL	Alan McLean	KM	Kevin Mair
AM	Alison Molloy	MR	Martin Reilly
BW	Brendan Williams	PD	Peter Douglas
DM	David Mentiplay	RL	Richard Lavery
DR	Drew Russell	RS	Richard Scoble
DS	Devanathan Sethuraman	SB	Stuart Byfield
GM	Gordon McLee	ST	Steven Templeton
TB	Tommy Brown		
	S Bentley's meetings		
DB	Douglas Blackburn	TH	Tom Hedley
DL	David Lavery	SBo	Steve Boys
EG	Erin Good	RW	Russell Williams
JM	Jamie Mallone	JF	John Flett
AB	Andy Brown	AC	Alex Cranston
AM	Andrew Medcraf	EC	Elspeth Craigie
KI	Karen Irvine	RMcL	Ross McLeish
GD	Graham Drummond	MP	Mike Pratt
RB	Richard Blanchfield	DH	Derek Henderson
JR	Jim Roddy	AG	Alastair Graham
RW	Russell Williams	EB	Eddie Burns
KH	Kevin Haggart	IMcM	Ian McMillan
GS	Gary Sargent	NB	Neil Beaumont
CJ	Colin James	PF	Peter Faulks
AC	Alan Coulter	KM	Kevin Mair
GH	Graeme Hamilton	LC	Lorne Cook
ST	Steven Templeton	AMcK	Alastair McKenzie
AJ	Aileen Jardine	MP	Mark Petrie
CL	Craig Low	LJ	Linda Jack
GI	Graham Innes	PD	Peter Douglas
DS	Devanathan Sethuraman	SH	Stuart Hill
JS	Jason Saxon	PR	Paul Rodgers
SC-L	Sheila Campbell-Lloyd	BMcG	Brain McGonigle
PM	Peter McKay	IP	Ishbel Parry
BMcM	Brian McCarthy	SC	Stefan Corbett
MW	Matt Wedgwood	MF	Mark Forrester
TM	Tim Muir	AMacK	Alan MacKintosh
HMcP	Hugh McPherson	GC	Graeme Campbell
GL	Glynn Lloyd	PH	Peter Haddow
IS	Ian Simpson	EM	Ewan Mattheys
G McL	Gordon McLee	SW	Stephen Waugh
AM	Alison Molloy	LM	Lee Mitchell
	S Waite's meetings		
ST	Scott Turkington	DF	David Friedman
LC	Liam Cruickshank	RW	Dick Woolston
CN	Colin Napier	MA	Melanie Anderson
JM	Jim Martin	GB	Gordon Bell

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 2010 only is shown in the table below:

Reporter/Team Member	Time spent (Hours)
D Arnell	239
S Bentley	343
S Waite	50
R Pacey	153
M Brandt	137
Total	922

The figures quoted above relate to estimated time expended to the final submission to WICS and Scottish Water. The figures exclude any work following the report submission.

We are very slightly over our target hours this year. In particular we spent more time than anticipated on the asset inventory and average pumping head.

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.

Tables A1 & A2

General

The overall methodology and calculation developed for producing the water balance which feeds into tables A1, A2 and E6 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 are still aware that different teams are responsible for individual table lines and that common data required by the different teams were supplied at different times before the base data had been finalised. This approach required reworking by the teams when revised data were identified.

Table A1

Between the AR08 and AR09 reporting periods, there was a significant increase in the number of unmeasured non-domestic properties. The increase resulted from data source and methodology changes following business separation and billing data migration by the CMA. Reasons for the significant changes were not apparent from the data supplied by CMA, and it was clear that there were a number of anomalies that needed to be resolved. WIC asked the Reporter to comment on the anomalies.

Scottish Water, the CMA and the LPs commenced a study in November 2009 to understand and resolve the anomalies in a data set of about 49,211 data entries flagged as "Vacant" for both measured and unmeasured non-household connected properties. The project is expected to be complete in July 2010 but all data corrections are unlikely to be effective before October 2010. It is therefore likely that the returns for AR11 will also be based on some anomalous data. We note that of 30,922 records that have been investigated and reclassified to date, by the end of the CMA accounting period "March R1 09" (equivalent to March 2010) only 170 records have been amended by the LPs from "Vacant" to "Occupied" out of a total of 7047 identified for correction. We are surprised that it appears to be taking so long to correct known data inaccuracies and are concerned that the issues with "Vacant" records are being forecast to carry over into AR11.

The knock on effect on Scottish Water is that, although the investigations increase confidence in the data as records are reallocated or removed, until all the records are revised in the CMA database Scottish Water has to continue to rely on the current datasets to calculate the water balance with corresponding impact on the confidence in the leakage estimate.

In common with water supplied, the sewerage CMA data includes approximately 33,000 properties flagged as "Vacant" which may in fact be occupied.

Discharge points (DPIDs) that are only occupied for part years are "annualised" up to whole year equivalents thus inflating the volumes – Scottish Water intends to stop the practice in AR11 (see also tables E8 and E9).

We noted that some volume records given to Scottish water showed anomalous monthly flows which may result from poor meter readings.

Table A2

Scottish Water has again calculated leakage using two methodologies one for the OPA calculation and a second for the A Tables, with the added benefit that the MLE adjusted estimate is now included in Table A2. The methodology for deriving the OPA leakage is on a 'like for like' basis as agreed with WIC whereas the calculation for the A tables takes account of changes to the data. While we understand that this has been agreed with WICS we are concerned that there remains a risk of confusion over the current level of leakage and therefore we welcome that the OPA calculation will no longer be reported in AR11.

The number of fixed charge animal troughs included in Water Taken Legally Unbilled has reduced this year to 11,616 from 13,599 in AR09 as part of the investigation into "Vacant" premises discussed above and following site visits. However there has been no reduction in the estimated 6,146 unbilled troughs that are included in the water balance. We also questioned whether they should be included under Water Taken Legally Unbilled or possibly more logically instead in the Unmeasured Non-household category. If reported under the latter category, they would be legitimately included in the metering programme.

Leakage from water trough 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, their lengths and the potential lack of maintenance, the resultant UGSP leakage of 0.61 Ml/d (reduced from 0.96 Ml/d in AR09) is likely to be underestimated. This is a further reason for metering all connections.

Table B2

The duration of loss of supply for some properties will be overstated because they only become affected when a valve is turned off to effect a repair. This may be some time after the time the first property is affected. The second 'water-off' time is not recorded and this results in an overstated incident duration for some properties.

The causes of interruption incidents are not always recorded, including those claimed to have been caused by third parties.

Analysis of planned interruptions which overran shows that in two cases work started too late to allow completion in the warned window. In other cases data errors indicated an overrun when in practice this may not have been the case.

Tables B3 and B3a

Only sewer flooding incidents caused by overloading of, or incidents affecting, public sewers are recorded. Laterals are not included although more than half of floodings from other causes originate from laterals and 66% of clear-choke forms returned referred to laterals. We recommend that WICS confirms whether flooding incidents and number of properties flooding due to defects on laterals should be included in future Annual Returns.

The validation carried out for internal flooding is not carried for external flooding and there is a significant level of missing data. Confidence in the answer is therefore lower. A significant uplift is applied to the numbers of external flooding incidents reported due to both overloaded sewers and other causes. It follows that a significant proportion of the numbers reported are not location-specific. Confidence in the number of external flooding incidents is lower than that in internal flooding incidents.

Areas at risk of external flooding are not routinely added to the at-risk register because of the large numbers involved and the lack of verification. A small number of areas have been removed from the register as a result of improvements made to resolve internal flooding. The assessment of severe weather for external flooding is based solely on the assessment made on site at the time of the incident and is not checked either by a desk study or by reference to Meteorological Office rainfall records as is done for all internal floodings.

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 over the last 3 years which are pleasing.

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.

The existing codes on the Peoplesoft billing system are currently not adequate to generate all lines in the return and some information is derived from a spreadsheet. We suggest that Scottish Water reviews the codes available on Peoplesoft to see if all information in the return can be generated from a single system.

As for last year we noted that following written complaints Scottish Water based its completion times on the time to send out a response and not the time when the resulting action was completed. The action frequently requires substantial work to investigate the problem which is subject to delays by the highway authorities and others, precluding the possibility of completing the action within the prescribed time limit. While we believe that Scottish Water's interpretation is reasonable we note that the definition of holding response and when it can be used to complete an action is not completely clear.

Table B8

As for last year we again noted that the WAMS system fails to encourage site staff to amend the resolution codes to the outcome as exercised on the ground. Although free text boxes are provided the contents can sometimes be ambiguous to later readers. 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.

We noted that sewer collapses had increased for a second consecutive year. We believe that Scottish Water should carefully monitor and analyse the reasons for the trend in this serviceability indicator, particularly if the current trend persists.

Table B9

We believe that the information presented by Scottish Water in the B9 table gives a reasonable representation of the resource situation in Scotland under current legislation.

In previous reports we discussed how uncertainty in the estimation of some of the inputs to the analysis can lead to uncertainty in the deficits in some areas and hence the SoSI score. This can be material where deficits are small. During our audit sensitivity analyses tested generic assumptions of 'Outage Allowance' and 'Treatment Works Losses'. The analyses suggested that they made marginal difference to the SoSI in 2009/10, but as leakage is reduced, the impact of these minor components will become more significant to future SoSI scores.

We remain of the view that it is a weakness that site specific outage allowance factors have not been derived for all the larger zones; the current generic 3% allowance may be material where zones are marginal.

Scottish Water continues to assess raw water transmission mains using an assumed overall average leakage of 21 m3/km/day. The estimate for the Water Balance suggests trunk main leakage at 10.05 m3/km per day. Although there are arguments why raw water losses may be greater than potable trunk main losses, we recommend that Scottish Water investigates and quantifies losses in a sample of mains where zone resources are in deficit.

D Tables

Scottish Water has reasonable rules for proportional allocation. However during our audits of Q&S2 and Q&S3a investment projects we found that for about 25% of the projects audited proportional allocation had not been revisited where project content had changed, resulting in potentially incorrect allocations.

Line D8.28 (water management and general expenditure) shows a figure of minus £47.804m. This is a programme adjustment item, entered because some capital maintenance, growth and customer services drivers were delivered at a higher cost than expected. In this context, Table G6 contains project 36660 – 'SW Risk Contingency – SWS Programme'. This has an estimated cost of £51m in 2009-10, but with very large positive and negative percentage allocations. This has the effect of making very substantial adjustments to the total cost of the drinking water, water capital maintenance and sewer flooding parts of the programme. These adjustments include an allocation of –135% to expenditure on water capital maintenance as stated in Table D8. These adjustments significantly skew the reported spending on capital maintenance investment.

Table D6 and Table H4

As for last year 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 different length each year. The changes reflect the changes in housing type from published local authority data which can have little effect on actual sewer lengths in the ground. We recommend that

Scottish Water reviews this procedure, which will otherwise increasingly corrupt the quality of the return data. This comment also applies to Table E7.

Following discussion Scottish Water provided the following statement about lateral sewer information:
"Information on lateral sewers could be collected as part of a data capture exercise, or by Operations staff as they attend chokes/collapses. The first option would be expensive and difficult to justify given other priorities as well as when weighing up limited budget versus business benefits. The second option would be less costly but, in order to capture enough data to improve on the current statistical calculation, would take many years to achieve.

"However, a business case is currently being raised to provide the field staff with the ability to update GIS direct when on-site; this will include the collection of information on lateral sewers but there is no guarantee that this will get approval to proceed."

We believe that appropriate asset data is fundamental to the proper administration of Scottish Water's business and recommend that the business case is carefully considered. We feel that Scottish Water should at least have a plan for asset information improvement even if it involves the very long term.

Tables E1 to E3a

Split of costs between sewage treatment and sludge treatment

We note that Scottish Water has a very sophisticated method of allocating costs to assets (ABM process) which is well managed, impressive and in advance of methods we have seen used elsewhere. However, our audits confirmed that for dual function sites with common cost capture the cost allocation between sewage treatment and sludge treatment are based on managers' estimates with no clear audit trails as to exactly what had been done. For the sites audited there were some costs which were captured direct to the asset but the majority of costs were based on manager allocation. We were not able to obtain copies of calculations for audit.

The variation between works and lack of auditable calculations mean we cannot confirm if these costs are correctly allocated, although we recognise that the judgements are made by experienced managers who know their works and the activities undertaken well.

We recommend that guidance is given to managers and that there is a documented audit trail showing the methodology used to calculate the split of costs between WWTW and Sludge Treatment for each works. Scottish Water confirms that it will work with Asset Management and Wastewater Operational team leaders and managers to improve the consistency across assets and reduce manager subjectivity for next year's return.

Tables E4 and E6

In AR09's audit we were shown Ellipse data that indicated that even basic data on pumpsets was lacking. In AR10, therefore, we asked to see Ellipse details for named new pumping equipment. These were also found to be incomplete.

We were told that Scottish Water is aware of data deficiencies in the Ellipse database and that the GIV AI team has a current project to bid for SR10 funding to cover asset data improvement for regulatory purposes. We are uncertain why the data is not already available for operational and managerial purposes.

Table E6

The line definition for line E6.1 requires consistency with Table A2, line 1 - the winter population (population supplied during the reporting year in Scottish Water's area of supply). The E6.1 definition "Average Annual Resident Connected Population" (average annual resident population connected to the water distribution system in each distribution sub area) is consistent in so far as the two definitions imply connected or supplied populations. However the reported numbers for both are the total Scotland population and not the serviced population as reported in line A2.5 and implied for line E6.1. The reasons for reporting the total winter population appear to be historic. We recommend that WICS clarifies exactly which number is to be reported if consistency is required.

Table E7

Data on sewage pumping are poorer than that for water supply. Whereas around 85% of water pumps have capacity data in Ellipse, only about 20% of sewage pumps do so. Data on numbers, capacities and types of pumping stations have been subject to significant infilling using data from known sites to infill missing pumping capacity and average head. This impacts the accuracy of average pumping head.

G Tables

Very large positive and negative programme adjustments appear in the Q&S3a programme. Project 40032 – Capital Maintenance Overhang Removals shows expenditure of -£38.188m post 2009-10 and project 36660 - SW Risk Contingency – SWS Programme shows expenditure of £51.000m in 2009-10, but with very large positive and negative cost allocations, including +235% to drinking water quality and –135% to water non-infrastructure. These adjustments affect the totals allocated to drinking water quality and water non-infrastructure capital maintenance, significantly skew the allocation of costs between programme areas and drivers for 2009-10 and post 2009-10 expenditure and result in a skewed picture of where expenditure has actually been made in Scottish Water's investment programme.

We have concluded that there is scope for a more comprehensive set of output codes and measures for capital maintenance and suggest that Scottish Water considers whether more codes would assist its business.

Proportional allocation of costs to drivers is less robust for Q&S2 projects than for Q&S3a projects. Not all Q&S2 projects have had proportional allocation revisited to realign allocations to drivers with the actual cost of meeting that driver. For both of the Q&S2 projects audited in detail for AR10 we found that proportional allocation had not been revisited at later Capex stages, despite changes to project content.

For some Q&S2 projects opex impacts were understated, compared with the project manager's latest best estimate, in one case because these had not been revisited following changes in project content and in another because an opex impact of +£411000 had been omitted in error.

Based on a small sample of individual projects there are indications that CAF forms may not always be accurately completed, which would affect the reliability of allocation of capital costs to functional areas.

H Tables

During our audit of the H tables we noted that some sites had large variations in MEAV compared to AR09. These were not always consistent with trends in capital expenditure and commissioning in the year. We also noted that many had small variations that approximated to inflation but had significant variability around the expected figure. We challenged Scottish Water as to the reason for these changes. As a result of our audit we concluded that the large movements in MEAV seen for a very small number of sites were caused by changes to the number and type of asset recorded at unit (rather than site) level, new construction or demolition or to changes in X-factor (i.e. capacity). Based on our small sample audit we are satisfied that changes in asset data have been substantiated, the correct cost algorithms used and unit level MEAVs correctly totalled to give site and asset type values for MEAV. We concluded that the variability in the effect of COPI on site MEAV was due to valid differences in the way COPI is applied to unit level assets and site-specific allocations.