Appendix D - Maintaining the supply demand balance

Introduction

The tables in Section D collect forecasts of: properties, population, and volumes (water and wastewater), together with a breakdown of capital expenditure necessary to maintain the supply demand balance. The tables also report actual and forecast security of supply indices, and water balance details.

Scottish Water's commentary for Section D should give an explanation for all forecasts and show how these translate into a least cost long-term portfolio of capital schemes that match ministerial objectives, the requirements of regulators or legal obligations.

The commentary should include (or add as annexes):

- a water resource plan;
- a leakage strategy (including Scottish Water's current assessment of the 'economic level of leakage'); and
- a strategy for sewerage service supply demand proposals.

The following guidance notes should be read in conjunction with the table line (or column) definitions.

Tables

Scottish Water should report forecasts of flows, property numbers, populations, expenditure, security of supply indices and the base year water balance in the following seven tables:

- Table D1 - Water service forecasts
- Table D2 - Dry year annual average - Security of supply index
- Table D3 - Critical period - Security of supply index
- Table D4 - Wastewater service forecasts
- Table D5 - Water and wastewater service capital expenditure

Tables D1 and D4 should be completed with Scottish Water's actual and forecast: property numbers, populations and average flow rates for different customer groups for each year given in the tables.

Tables D1 and D4 also show the Scottish Water -wide water balance based on actual figures for the base year and forecasts for the plan period.

Tables D2 and D3 show the planned overall Security of Supply Index (SoSI) for each zone and compute the index for the region (i.e. the entire Scottish Water supply area) based on estimated dry year distribution input figures. The tables are arranged with the steps in the calculation shown in each column to enable the calculation for each supply zone to be entered on each line. The final line is a single entry in the extreme right hand column for the region as a whole.

Table D2 provides Scottish Water with the opportunity to set out:

- base year SoSI for annual average dry year conditions (if different from the Annual Return);

- forecast annual changes in SOSI, on a zonal basis, through the plan period.

Table D3 should be completed where supply/demand investment is driven by peak demand conditions (ie critical period rather than average).

Scottish Water should provide in its commentary a Scottish Water-wide forecast of SoSI for each year of the plan (2010-11, 2011-12, 2012-13, and 2013-14). Tables D2 and D3 can optionally be submitted for each of these years if Scottish Water wishes to show the movement in the expected supply/demand balance throughout the review period. However, Scottish Water should demonstrate as a minimum that the planned changes at the Scottish Water-wide level are fully supported by schemes included in Appendix C 'Investment and Outputs Plan.

It should be noted that an index score of 100 indicates there are no deficits against target headroom in any zones, a score of 90 to 99 suggests marginal deficit, and below 90 means there are significant deficits.

The Scottish Water-wide index for the Scottish Water is a single entry in the final column of the table: one minus the sum of the index for all zones. Zones without a deficit have an index value of zero.

Table D5 contains breakdowns of the supply demand operating and capital enhancement expenditure, which should be the same as the summary Supply demand lines in Section 4 (Operating Expenditure) and 6 (capital enhancement).

Scottish Water guidance

In Section D Scottish Water should set out its strategy for maintaining the balance between supply and demand for the water and wastewater services.

The focus should be on the implications for the business of maintaining (or restoring) service levels in the face of future influences on the balance between supply and demand. Scottish Water should set out how these costs relate to ministerial objectives, the requirements of other regulators and any other specific legal requirements.

Scottish Water's supply demand strategy should include full details of its:

- Leakage strategy - Including an appraisal of the 'economic leakage level' (ELL), planned future leakage levels and leakage estimation methods
- Water resource plan - Including assessments of the security of supply index and details of any sustainability reductions
- Wastewater plan, including sludge management
- Any proposals for managing demand through improved water efficiency

We particularly wish to understand that Scottish Water's supply/demand proposals are based on a long term, least cost, robust and coherent plan.

Scottish Water should explain how expenditure projections in Table D5 are consistent with schemes contained in the investment and outputs plan.

Table D5 does not ask for maintenance expenditure to be reported. However, Scottish Water should additionally set out in the commentary a summary level view of the expenditure it requires to maintain the supply demand balance and comment on any specific large schemes that are for this purpose.

Suggested structure of Section D:
We suggest that this part of the submission be divided into two sections for each service. This structure should provide a framework for Scottish Water to otherwise explain its strategy for maintaining the supply demand balance in its own way.

Maintaining the supply demand balance
Section 1 Strategy
Section 2 Expenditure implications of maintaining the supply demand balance

SECTION 1: Specific points Scottish Water should address in its strategy

Water service strategy

Scottish Water should set out the base year supply demand balance in Table D1, and provide a discussion of the confidence grade. We believe Grade A reflects an excellent understanding of the water balance and Grade B a good understanding. We would expect other grades to be accompanied by a plan of action to obtain an improved balance as soon as practicable.

Scottish Water should describe any planned interventions necessary to restore the balance or maintain security of supply. Any supply demand intervention schemes should be consistent with the draft water resource plan.

Broadly there are three main reasons why Scottish Water may seek enhancement expenditure for balancing supply and demand:

- To meet growth in demand from customers (either existing or new)
- To restore the security of supply to customers, because of a downward revision to deployable output, because of possible climate change impacts, or reductions to abstractions for sustainability reasons
- To enhance service levels by providing a stepped improvement in the levels of service for water supply reliability, whether this is to remove an existing deficit against target headroom, or to improve levels of service where justified by customer support

The Scottish Water strategy commentary should additionally contain or be accompanied by the three following detailed sections:

- Economic Leakage assessment
- Leakage strategy
- Water resource plan

Economic Leakage assessment:

Scottish Water should include a fully detailed analysis of ELL for the plan period, clearly setting out: all modelled input data, the method used, and all assumptions made. Scottish Water data should be used wherever possible and where not

available, this should be explained. We also wish to understand the sensitivity of the findings to realistic changes in input data, particularly the marginal cost of water and the unit costs of detection and repair.

Leakage management strategy:

Scottish Water should set out its strategy for leakage control throughout the plan period, taking account of the initial assessed ELL, and a realistic timescale for this to be achieved. As a minimum, the management strategy should be prepared in accordance with WIC24. This section of the commentary (or appendix) should contain full details of DMA coverage, and the extent of reliable night flow data throughout the region, including the assumptions applied to obtain a leakage estimate from non-reporting DMAs. We are interested to understand the proportion of DMAs reporting sound data at any one time and the proportion of the supply area for which extrapolated leakage assessments are and will be made. Scottish Water should also set out in detail its methods and assumptions for estimating leakage from night flows, including: what constitutes a minimum night flow, what legitimate night flow allowances (household and commercial) are being applied, and what day/night pressure variation allowances are used. This section should also discuss how estimates are made for trunk main losses and service reservoir overflows/seepage. Finally, Scottish Water should set out how it allocates leakage control expenditure, where we expect most expenditure to be operating costs.

Water resource plan:

Scottish Water should follow any guidance issued by SEPA; otherwise comprehensive guidance is available from the Environment Agency.

We expect the water resource plan to consider all the relevant supply and demand issues, take account of the leakage strategy (itself based on the ELL assessment), then propose a least cost (over 25 years) programme of activity based on, realistic assessments of: deployable outputs, outage, sustainability reductions, imports, exports, demand forecasts, water efficiency initiatives, headroom and demand patterns (peak and average), climate change etc. The findings should be subjected to a sensitivity analysis.

Scottish Water should summarise in overview:

- Key aspects of its water resource strategy, with primary focus on expected interventions during the period 2010-2014, highlighting any major areas of overlap with expected quality enhancements or maintenance schemes
- The security of supply index for the base year and that forecast for the plan period
- The schemes to deliver planned improvements in the security of supply index (including the expected date for beneficial completion, expenditure, outputs and location or zone)
- Its strategy (if any) regarding metering, including an assessment of the likely cost and demand impact
- Whether consideration has been given to developing more effective price signals as part of its strategy for managing demand
- Its strategy in relation to new development/customers
- Its strategy in relation to water efficiency

- Its strategy in relation to leakage control, the assessment of ELL and how/if it has incorporated social and environmental costs in the ELL analysis
- Its assumptions surrounding supply/demand outputs, including its security of supply index, which it should set out for: dry year annual average conditions and critical period conditions in Tables D2 and D3 respectively
- Any schemes to replace water lost to sustainability reductions
- The base year water balance, and how/if this is predicted to change through the plan period

Water service forecasts

Table D1 should be completed to show demand resulting from the implementation of Scottish Water's strategy. The table sets out a forecast of demand by component upon which the expenditure forecasts should be based.

Tables D2 and D3 should be completed to show the security of supply index for the water service, which should be consistent with the draft water resource plan. Table D2 sets out the SoSI for dry year annual average conditions, and Table D3 does the same for the critical period where this is appropriate driver for supply demand enhancement investment.

Sewerage service strategy

Broadly there are five main reasons why Scottish Water may seek additional expenditure above that required to meet Ministers' objectives, for balancing wastewater supply and demand:

- Additional flows from new customers, including infill development
- Additional flows from existing customers
- Increased hard area drainage
- Illegal connections
- Changes in storm intensity

Scottish Water should summarise in overview:

- How it has carried-out cost planning for wastewater supply-demand;
- How it has derived its forecasts of demand for sewerage services including the steps it has taken to ensure consistency with water resource plans, and how future demand compares to past trends and what sources of information it has used;
- The rationale for its approach to determining target headroom for sewerage catchments with reference to its customers' willingness to pay and its statutory duties;
- The rationale for its approach to assessing the potential consequences where it is judged that investment in the planning period is judged possible, rather than probable, with reference to its customers' willingness to pay and its statutory duties;

- Its general approach to catchment modelling, and identifying feasible solution options;
- How it has incorporated social and environmental costs;
- The interaction of its plan with the Capital Maintenance and other elements of the enhancement programme; and
- The effects of environmental legislation.

Scottish Water should also provide the following information:

- A comparison of planned annual supply demand expenditure (and outputs) to previous outturn programmes
- How the plan is influenced by climate change

Table D4 should be completed to show wastewater volumes collected following the implementation of Scottish Water's strategy. The table sets out forecasts of demand by component upon which the expenditure forecasts should be based.

SECTION 2: Capital expenditure implications of maintaining the supply demand balance

This section gives general guidance for completing capital expenditure Tables D5 and D6 for water and wastewater services respectively. It should be noted that relevant operating costs are collected in Section 4

General guidance is applicable to tables for both the water and sewerage services.

Expenditure allocation

When allocating expenditure, Scottish Water should carry out proportional allocation as set out in RAR2. Where a supply/demand balance driven scheme includes other elements, the expenditure should be proportionally allocated. Only the supply demand balance cost of any scheme is to be included in tables D5 and D6.

Scottish Water should set out its approach to forecasting all capital expenditure in Section 5 of the business plan, including its approach to determining capital efficiency.

Capital expenditure

Capital expenditure for both services should be reported in their infrastructure and non-infrastructure constituents in accordance with RAR2.

When allocating costs between the new development and growth categories, it should be noted that:

- New development costs relate to the provision of local distribution assets to provide water services and sewerage network assets for new customers with no net deterioration of existing levels of service. These should be entered net of any 'grants and contributions', with an explanation of any assumptions required to do this in the commentary.

- Growth costs relate to the provision of assets associated with meeting or offsetting changes in demand from new and existing customers, while maintaining existing levels of service.

Scottish Water should describe any projected optional metering proposals and costs.

Table D5 Expenditure to balance supply and demand – water and wastewater service

Total capital expenditure (pre-efficiency and overlap) associated with the preferred water resources management strategy should be reported in table D5, including the following elements of leakage control expenditure:

- The replacement of whole lengths of main to repair leaks whilst reducing leakage year-on-year;
- DMA first time set-up capital costs for example: DMA isolation, provision and installation of DMA meters, loggers and telemetry, etc.;
- The initial provision, installation and commissioning of new pressure management valves.

Where additional leakage control (below ELL) has been identified as a cost-effective means of balancing supply and demand and this results in a stepped change in leakage, then the relevant capital expenditure (as above) should be discussed in the commentary.

Other leakage control costs are generally to be treated as either capital maintenance or operating expenditure. Expenditure on maintaining leakage at the average level of the previous year should all be noted in the commentary,. It is important to have a sound understanding of the 'natural rate of rise' of leakage in DMAs.

Other expenditure to be reported in table D5 includes the capital cost of investigating the impact of supply demand abstraction, climate change and licence issues.

In its commentary, Scottish Water should discuss the cost and impact of capital expenditure under the following categories:

- Growth excluding demand management
- New development
- Leak repairs by whole pipe replacement when reducing leakage year-on-year
- Demand management
- Sustainability reductions required by SEPA

Expenditure projections reported for each of these categories should also reconcile to the investment and outputs plan.

Scottish Water should explain how the costs included in this table are consistent with its draft water resources plan, detailing where and why any changes have been made.

Scottish Water should include the capital costs for schemes to replace water lost to sustainability reductions, consistent with the water resources management plan.

Scottish Water should also provide details in this section of expenditure intended to provide a stepped improvement in the levels of service for water supply reliability, whether this is to remove an existing deficit against target headroom, or to improve levels of service where justified by customer support.

No costs associated with schemes to comply with the SEMD should appear in this section.

Wastewater

Scottish Water should report capital expenditure under the following categories:

- Sewage treatment infrastructure (growth)
- Sewerage infrastructure (growth)
- Sewage treatment non-infrastructure (growth)
- Sewerage non-infrastructure (growth)
- New development infrastructure sewage treatment
- New development infrastructure sewerage
- New development non-infrastructure sewage treatment
- New development non-infrastructure sewerage
- Grants and contributions (infrastructure and non-infrastructure)

Sewage treatment (growth)

These costs relate to individual schemes anticipated during the plan period, to accommodate increased flow and / or concentration at treatment works. Capital expenditure relating to the provision of local distribution assets to provide a sewerage service to new customers should be excluded from sewage treatment (growth) expenditure and included under new development.

Sewerage (growth)

Under this category Scottish Water should report the costs of work to prevent new sewer flooding problems and increases in the number of unsatisfactory combined sewer overflows caused by additional flows to sewers downstream from new development and other causes of growth in flows to sewers. Capital expenditure relating to the provision of local distribution assets to provide a sewerage service to new customers should be excluded from sewerage (growth) expenditure and included under new development.

Expenditure on first time rural sewerage to meet quality obligations should be excluded from supply/demand balance expenditure.

Aggregate expenditure projections reported must be consistent with the investment and output plan. Details provided in the database should be on a scheme specific

basis where data are available. Otherwise, Scottish Water should detail an aggregate balancing item for the water service and separately for the wastewater service.

Scottish Water should include in its commentary a summary of changes to the assumptions made at the 2006-10 Strategic Review, together with the reasons for making the changes.

Reporter Guidance

The Reporter's report should follow the same format as Scottish Water's submission, namely:

- Section 1: strategy; and
- Section 2: expenditure implications of maintaining the supply demand balance.

Section 1: Strategy

General guidance for water and sewerage services

For tables D1, D2, D3, D4 and D7, the Reporter should examine and comment on the robustness of material assumptions underpinning the demand and supply forecasts. The Reporter should check and comment whether assumptions made by Scottish Water are consistent across reporting categories and across years, in particular:

- Comment on the consistency of the information submitted with the ELL appraisal;
- Comment on the consistency of the information submitted and explanations given, with the draft water resource plan;
- Comment on the basis of population changes; in particular whether the population forecast figures have been derived from the most recent Office of National Statistics (ONS) estimates or local authority estimates or Scottish Water's update of these estimates. If Scottish Water has revised the most recent ONS or local authority estimates, the Reporter should determine the basis for the changes and assess whether they are robust;
- Give an opinion on the economic justification for any proposed changes in levels of service.

Specific guidance for the water service strategy

The Reporter should examine Scottish Water's resource plan, and comment on:

- Consistency between the resource plan and the draft business plan;
- Any issues associated with the draft water resources management plan that remain unresolved.

The Reporter should also:

- Comment on the economics and practicality of any metering strategy;
- Comment on Scottish Water's water efficiency strategy, and the economics and robustness of costs and savings assumed;
- Summarise the robustness of Scottish Water's leakage strategy including its ELL assessment;
- Comment on the supply demand outputs proposed. Are these consistent with the strategy, and can they be delivered?
- Comment on any sustainability reductions in the plan. The Reporter should verify the reductions required by SEPA, and comment on customer support for any voluntary reductions. The Reporter should also provide a view as to whether Scottish Water has adequately challenged the basis of any required reductions;
- Comment on the forecast of water delivered to different customer groups, in particular the amount of water lost through leakage and water delivered to measured and unmeasured household customers;
- Confirm or otherwise whether the baseline supply demand balance is consistent with ongoing leakage and demand management strategies and whether the final supply demand balance is consistent with the final leakage and demand management strategies;
- Confirm or otherwise whether the final supply demand balance is consistent with the water resource plan and has been calculated correctly at Scottish Water-wide level;
- Comment on the effects of climate change, in particular any changes in the components of household consumption and changes in the amount of water available for supply. If climate change is cited as being a material assumption behind the demand and supply forecast, the Reporter shall comment on the assumptions made and their basis.

Specific guidance for the sewerage service strategy

The Reporter should:

- Confirm or otherwise that Scottish Water's explanation of its sewerage strategy is consistent with a rational long term least cost wastewater plan;
- Confirm or otherwise if the approach has been consistently applied;
- Scrutinise and comment on the approach to assessing the current supply demand balance of sewerage catchments and future supply demand balance. This includes highlighting assumptions underpinning the assessment of growth in flows to sewers, with regard to the components of infill development, additional flows from existing customers, increased hard area drainage, illegal connections and changes in storm intensity.

Section 2: expenditure implications of maintaining the supply demand balance

General guidance for the water and sewerage services

For tables D5 and D6, the Reporter should ensure that Scottish Water has followed the guidance. In particular, the Reporter should:

- Comment on the method used to proportionally allocate expenditure between categories and whether it has been consistently applied;
- Comment on how reliably Scottish Water has allocated expenditure between new development and growth categories;
- Comment on the methods and assumptions underpinning grants and contributions;
- Confirm or otherwise the consistency of scheme costs with the investment and output plan.

Specific guidance for the water service

The Reporter should examine specifically: the water resource strategy, the ELL calculation and the leakage strategy and comment on whether:

- Scottish Water has followed current industry guidance;
- The analysis is comprehensive and based on reliable data and realistic assumptions;
- The results are sensitive or otherwise to minor changes to input data.

The Reporter should also comment on whether the supply demand capital investment programme is an optimal least cost solution. In particular:

- Are the underlying cost assumptions for each of the schemes what you would expect?
- Are the maintenance / replacement frequencies of option comparisons reasonable?
- Has Scottish Water correctly calculated the net present value of capital and operating costs of different options?
- Is the NPV analysis period long enough to ensure a long-term view? (this should be 25 years or more)
- Has Scottish Water taken adequate account of environmental and social costs?
- How rigorously has the cost of carbon been considered?
- Have any operating costs savings been taken into account in selecting least overall cost solutions?
- Has Scottish Water correctly calculated the AISC, particularly where the peak period is a factor for investment planning?
- What is the basis for estimating outputs and costs? We expect realistic (central tendency) estimates and not conservative estimates
- Has Scottish Water followed the principles of the EBSD guidance?
- Has an acceptable method been used to screen the unconstrained options list, or have potentially valid options been excluded?
- Has the economic level of leakage been determined in line with best practice? For example, as set out in Future approaches to leakage target setting for

water companies in England and Wales (WRc, 2002) and supplemented by Inclusion of externalities in the ELL calculation (RPS, 2007)

- What is the basis of the modelling routine (eg: a simple AISC approach) chosen by Scottish Water and is it appropriate to the problem?
- Can Scottish Water implement its plan, or are there any major factors, such as risk, that make it unacceptable?

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Specific Reporter guidance for the sewerage service

The Reporter should:

- Scrutinise whether Scottish Water has correctly identified the most appropriate cost categories and whether the solution required and unit costs are based on the most robust and pertinent data including information about costs of recent similar schemes.
- Confirm or otherwise whether a realistic range of feasible options have been appropriately considered for option appraisals
- Scrutinise the estimates of costs and benefits included in each project appraisal and comment on the robustness of these estimates including a comparison with the costs of recent similar schemes;