

**The Water Industry Commission for Scotland  
Scottish Water**



**Scottish Water**

**Reporter's Report on the  
SR10 2<sup>nd</sup> Draft Business Plan  
Appendix A – Final Cost Base**

**March 2009**

**SCOTTISH WATER  
REPORTER'S REPORT  
SR10 2<sup>nd</sup> DRAFT BUSINESS PLAN  
APPENDIX A – FINAL COST BASE**

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**ABBREVIATIONS**

IDBP	first draft Business Plan for SR10
ADP	Associated Delivery Partner
AR04	Annual Return 2004 (relating to the Cost Base submission at AR04)
Capex 3	Capex 3 project approval stage generally related to approval of target cost estimates
CBS	Cost Breakdown Structure
COPI	Construction Output Prices Index
CSO	Combined Sewer Overflow
EES	Engineering Estimating System
Q&S2	Investment period 2002-06
Q&S3A	Investment period 2006-10
Q&S3B	Investment period 2010-14
Q&S4	Investment period 2014-18
SDP	Special Delivery Partner
SR10	Strategic Review of Charges 2010-14
SR06	Strategic Review of Charges 2006-10.
UID	Unsatisfactory Intermittent Discharge
WICS	Water Industry Commission for Scotland

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**SCOTTISH WATER**  
**REPORTER'S REPORT**  
**SR10 2<sup>nd</sup> DRAFT BUSINESS PLAN**  
**APPENDIX A – FINAL COST BASE**

## **A1 INTRODUCTION**

### **A1.1 General**

This report on Scottish Water's SR10 Final Cost Base has been prepared for the Water Industry Commission for Scotland (WICS) by the Reporter in response to the Reporter Guidance set out in the SR10 guidance issued by WICS on 15 October 2008. The guidance is reproduced in Annex 1 of this report.

This report was initially prepared as a stand-alone report on the SR10 Draft Final Cost Base which was submitted by SW on 9th January 2009. This final report addresses the changes made by Scottish Water to its Cost Base taking account of issues raised in our draft report and further guidance and requirements arising from WICS moderation and query process.

The report has been amended to address the changes made to the standard costs by Scottish Water since the Draft Final Cost Base submission. Where standard costs have not been amended the text of our previous report has been reproduced.

The report is set out in the following sections:

Sections A2 to A6 sets out the Reporter's general commentary on the Cost Base Submission as follows:

- |            |  |
|------------|--|
| Section A3 | Summarises changes from the Draft Final Cost Base.   |
| Section A4 | Considers sources of data and methodology. In particular, it outlines the estimating systems used to prepare the standard cost estimates.  |
| Section A5 | Addresses special factors. Scottish Water has not reported any special factors which might affect the comparison of its standard cost estimates with similar estimates in England & Wales. |
| Section A6 | Comments on the independence of Scottish Water's standard cost estimates.  |

Sections A7 to A10 provides detailed commentary on the standard cost estimates in Tables 2, 4, 6 and 8 of the Cost Base submission. In each section we:

- Provide a commentary on SW's interpretation of individual or groups of standard costs.
- Provide a commentary on the sources of cost data used by SW to prepare estimates for the standard costs including the indirect costs and corporate overheads used.

- Comment by exception on the adjustments and exclusions applied by SW when preparing the standard costs estimates.
- Comment on the judgements made by SW on the robustness of the standard costs (confidence grades).

Section A11 provides commentary on SW's allocation of forecast expenditure during 2010-14 by asset type within four sub-service areas.

Section A12 provides commentary on the comparison of selected standard costs with the equivalent 2004 standard cost estimates.

## **A1.2 Approach to the Audit**

We reviewed the reporting requirements for the Cost Base submission and prepared an audit plan for the work which was included in our audit plan for the 2<sup>nd</sup> draft Business Plan.

Our audit of the Cost Base submission drew on our audit of the costing systems Scottish Water used to prepare the 2nd draft Business Plan investment programme estimates. Our audit of these costing systems is described in Appendix G. Key points relating to the Cost Base are summarised in Section A4 and issues relating to individual standard costs are discussed in the section of the report relating to that standard cost.

We met with Scottish Water staff to obtain an overview of the submission and understand the methodology used to scope and price the works.

We met with Scottish Water staff to understand the sections of the Cost Base submission which Scottish Water has not completed

We audited each standard cost estimate submitted by Scottish Water. These audits included:

- Receipt and review of the estimate and supporting documentation provided in advance of the audit.
- A meeting with Scottish Water staff where the scope and cost estimate were reviewed and challenged, more detailed source documentation reviewed and the translation of the estimate to the CBS checked.
- Following the audit we received and reviewed further supporting information and response to queries provided as a result of points raised in the audits.

We checked the translation of data from the detailed estimates to the CBS sheet to the final standard costs entered in Tables 2, 4, 6 and 8.

For tables 1, 3, 5, and 7 we audited the entries on the tables back to the projects database that was used to generate the entries other than allocations of infrastructure assets to different road types. For this allocation we reviewed the assumptions made by the various team leaders who developed the capital programme.

Following submission of the Draft Final Cost Base, we:

- Responded to comments raised by WICS.
- Audited the changes to the standard costs summarised in Section A2.
- Amended the Cost Base.

### **A1.3 Reporter Guidance**

Reporter guidance is reproduced in Annex 1.

**A2 SUMMARY OF CHANGES FROM DRAFT FINAL COST BASE**

SW has made the following changes from the Draft Final Cost Base:

Tables 1, 3, 5 & 7	The tables have been updated to reflect the final allocation of expenditure in the 2nd draft Business Plan.
Table 4, Line 2	The rapid gravity filter cost base cost function has been revised to address comments made in previous audits.
Table 4, Line 4	A bottom up estimate has been developed in place of the previous estimate which was based on EES cost base functions subject to a refurbishment factor based on a supplier quotation.
Table 4, Line 8	A bottom up estimate has been developed in place of the previous estimate which was based on EES cost base functions subject to a refurbishment factor based on a supplier quotation.
Table 4, Line 9	A bottom up estimate has been developed in place of the previous estimate which was based on EES cost base functions subject to a refurbishment factor based on bottom up estimates.
Table 4, Line 7	The flow yardstick used to cost the plant has been changed from 2.5 Mld to 2.48 Mld. SW has assumed that the output of the existing borehole will not increase from the current output of 2.5 Mld and 1% of flow will be discarded as waste, reducing the new plant output. The denominator for the standard cost has remained at 2.5 Mld.
Table 4, Line 13	The PLC unit included in the previous estimate has been removed in line with the Cost Base specification.
Table 8, Line 1	The scope of works has been amended to reflect a revised assumption which has reduced the distance between ground level and top water level. Excavation quantities have been amended to allow working room around the structure. The UID on-costs have been applied.
Table 8, Line 2	The scope of works has been amended to reflect a revised assumption which has reduced the distance between ground level and top water level. Excavation quantities have been amended to allow working room around the structure. The UID on-costs have been applied.
Table 8, Line 3	The excavation quantities have been revised for an open excavation. The UID on-costs have been applied.
Table 8, Line 10	An allowance has been made for 24 hours storage of the additional sludge quantity arising from the addition of ferric dosing.
Table 8, Line 12	The flow to treatment has been reduced to 4,500 m <sup>3</sup> /d. The allowance for civils works has been reduced to minor modifications to fit the new UV plant.

Table 8, Line 13      A standby screenings handling plant has been added based on a revised quote for the works. SW has deflated the estimates for the screens and pump set to mid 2007-08 prices. The denominator has been amended to one unit.

SW has amended its report in line with its response to queries raised by WICS through the moderation process. In its response to queries SW indicated whether or not it intend to amend its submission as a result of the query. SW has only amended its submission where it had indicated it would.

For this submission, SW has expanded to level of detailed information included in the CBS.

## **A3 CONTENT AND DEVELOPMENT OF THE COST BASE SUBMISSION**

### **A3.1 Overview of the Development of the Cost Base Submission**

Scottish Water appointed an internal manager to manage and co-ordinate the response to the Cost Base.

Estimates were made of the value of different elements of work in the 2010-14 Investment Plan and Tables 1, 3, 5 and 7 completed. As a result of this a judgement was made on the standard cost estimates which would be submitted.

For each standard cost estimate a scope of works was prepared based on SW's interpretation of the Cost Base specification and, where possible, taking account of SW's standards or current practice.

Scottish Water has not undertaken any specific assessment of options or alternatives to demonstrate that the standard cost estimates represent least whole life cost solutions. SW has relied on the use of solutions which are standard practice and cost models which capture historic practice. This reflects SW's on-going assessment of technology and solution development which includes an assessment of whole life costs as new technology is adopted and schemes developed.

A decision was then made on the most appropriate source of cost data for each standard cost estimate. These included:

- pricing at a process unit level using cost functions which are also used to cost similar work in the 2nd draft Business Plan;
- bottom up estimates priced using rates taken from tenders submitted by Associate Delivery Partners currently engaged on delivery of the Q&S3A capital programme;
- bottom up estimates priced using specific quotations from suppliers using, where possible, suppliers with current framework agreements with Scottish Water.

The cost estimating systems used are mainly based on Scottish Water's own data and can be related to costing systems which are being used for the 2nd draft Business Plan or to the source data used to develop the costing systems which are being used for the 2nd draft Business Plan.

The data in the underlying costing systems has been revised and updated for the 2<sup>nd</sup> draft Business Plan. Data used is predominately taken from SR06 Capex 3 estimates. Reliance on Q&S2 data and AR04 legacy data has reduced significantly from the 1DBP submission.

Where necessary, unit rates and on-cost rates were adjusted to reflect the general and specific exclusions of the Cost Base specification drawing on the experience and detailed knowledge of Scottish Water's costing data and cost estimating systems.

During our audits we noted that the development of the standard cost estimates was well documented. Typically, Scottish Water could provide:

- A "scope" document recording inclusions, assumptions and exclusions.

- Where necessary, process calculations to size the works.
- Where necessary, sketches and take-off of quantities to define the scope of works priced.
- An estimate sheet with the priced scope of works which could be related to the CBS sheet submitted.
- Supporting documentation for the rates and prices used including the tendered price schedules, cost function data, specific quotations and supporting price schedules from frameworks agreements.

The assessment of the proportion of expenditure in Tables 1, 3, 5 and 7 was prepared from a detailed analysis of the expenditure programme as at December 2008 at asset and driver level. Only a proportion of the capital programme was used to populate the tables but this was higher than the proportion used for the 1<sup>st</sup> draft business plan, when much of the capital maintenance programme was omitted. For this draft, approximately 80% of the Investment Plan has been included in the analysis. Scottish Water has excluded those works that it believes should not be covered by efficiencies derived from the Cost Base analysis. It has defined these as works to which a “custom efficiency” is better applied. Categories of investment excluded from the analysis include:

- Management and General projects
- Modelling and study only projects including those for UIDs
- Service diversions for local authorities
- Reasonable cost contributions
- Start early projects for Q&SIV
- Loch Ryan Project

During our audit we noted that the Cost Base submission was subject to technical scrutiny and challenge by Scottish Water’s Asset Management senior management team and the SR10 Steering Group which considered the principal content of the submission. The Cost Base Project Team also had challenge meetings to review the scope and ensure consistency.

Scottish Water co-operated well with the Reporter’s team in carrying out the audit. Estimates and supporting documentation were provided in advance of the audits. The supporting information provided during the audits was well structured and provided a detailed audit trail. Detailed additional information and response to queries were provided.

During our audit we noted that Scottish Water had scheduled out the recommendations and comments made in our report on the first draft Cost Base and tracked its response to the issues raised. We concluded that issues raised in our report on the first draft Cost Base had been satisfactorily resolved or explained by SW in this submission. Any remaining concerns we have on SW’s revised submission are set out in the subsequent sections of this report.

During our audits we raised a number of issues regarding general principles or individual standard cost estimates. Scottish Water responded to our feedback and, where necessary, undertook additional work to address the concerns raised. We have commented on any issues which remain unresolved in the detailed commentary below.

### A3.2 Commentary on Standard Costs not completed by Scottish Water

Scottish Water has not completed the standard cost estimates which are itemised below.

#### A2 Block B *Mains laying by directional drilling*

SW notes that its forecast expenditure is <2% of expenditure in the activity area.

We believe that SW's statement is reasonable and consistent with the 2010-14 Investment Plan, although we believe that some limited directional drilling is being carried out in SR06.

#### A2 Line 11 *New communications pipes*

SW notes that this type of work is "Part 1" development where the work is carried out, and paid for, by the developer. As a result, it holds no cost data.

We believe that SW's statement is reasonable and consistent with the 2010-14 Investment Plan. Scottish Water's Guide for Obtaining New Water and Waste Water Services states that new communication pipes form part of the "Part 1" infrastructure which is constructed at the expense of the developer and does not form part of the reasonable costs contributions which Scottish Water makes towards the development of new infrastructure.

#### A2 Block E *Household meters*

SW notes that it does not propose investment in household meters in 2010-14.

We believe that SW's statement is reasonable and consistent with the 2010-14 Investment Plan. There has only been limited up take of domestic metering in Scotland. We understand that there is no expectation that compulsory metering will be required to address water resource issues or associated environmental concerns.

#### A4 Line 1 *New treatment works type SW4, output 30Ml/d*

SW notes that its 2010-14 Investment Plan does not include any new treatment works of this size and type.

We believe that SW's statement is reasonable and consistent with the 2010-14 Investment Plan.

SW's suite of cost functions would allow it to cost a works of this type and size. However, because the Business Plan does not include work of this type

and scale, these cost functions are not representative of the Business Plan. In the absence of similar projects of this degree of complexity in the SR10 Investment Plan it would be difficult to confirm that the process selection and design parameters used for a standard cost would be a reasonable and consistent with the SR10 Investment Plans. As a result, we believe that it is reasonable to omit this item from the Cost Base.

*A4 Line 3 New abstraction borehole treatment works with simple disinfection only, output 5Ml/d*

SW notes that the specific nature of this work (drilling a borehole in chalk) is not applicable in Scotland due to the geology of the area. Boreholes in Scotland tend to be in river gravels, the cost of which will not be comparable with chalk boreholes as the method of drilling and casing requirements are technically very different.

We confirm that many boreholes in Scotland are in gravel beds connected to river sources. We accept that there are differences in drilling in chalk and river gravels but do not believe that these are material in terms of the standard cost estimate. We understand that new borehole sources do not form a material element of the 2010-14 Investment Plan and so believe that it is reasonable to omit this item from the Cost Base.

*A4 Line 5 Alterations to water treatment works type SW2, output 30Ml/d*

This work relates to the provision of a membrane plant to provide a barrier against the transmission of cryptosporidium.

SW notes that the maximum output of a site covered by the DW23 programme is 11.5Ml/d and that there is no work proposed at a 30Ml/d site in 2010-14.

Work of this type, but not of this scale, is a significant feature of the 2<sup>nd</sup> draft Business Plan. Unlike the 1<sup>st</sup> draft business plan many of these are now categorised as “essential”. SW’s cost model for the key membrane process required to prepare this standard cost include data points up to 27 Mld. However, SW’s essential and desirable programmes only require plant of this type up to 11.5 Mld.

In view of the size of plant required for the second draft Business Plan, we consider that it is reasonable for Scottish Water to omit this item from its Cost Base submission.

*A4 Line 6 Installation of a nitrate removal plant at a borehole treatment works with simple disinfection only, output 10Ml/d*

SW notes that it does not carry out nitrate removal and that this type of work is not part of the Investment Plan.

We believe that SW’s statement is reasonable and consistent with the 2010-14 Investment Plan.

*A4 Line 12 Replacement of variable speed pumps, output 6 to 9Ml/d*

SW notes that it does not undertake this type of work. It comments that the shaft driven pumps specified by the Cost Base question are not used by Scottish Water, due to reliability and operating cost issues and are excluded from its Standards and Specifications.

We believe that SW's statement is reasonable but currently have no data on whether any such work could be undertaken as part of SW's capital maintenance programme.

*A8 Line 8 First time rural sewage treatment, p.e. 200*

SW notes that first time provision is not part of the 2010-14 Investment Plan.

While SW has undertaken work of this type in Q&S2 and Q&S3A, first time rural sewage treatment does not form part of the 2010-14 Investment Plan. However, the 2010-14 Investment Plan includes process improvements for a range of small sewage treatment works. Scottish Water noted that its Q programme for small sites generally involves phosphorus and ammonia reduction while first time rural treatment involves primary treatment with sometimes secondary treatment. We accept that there are significant differences in the two programmes and the type and scale of work involved and conclude that it is reasonable to omit this item from the Cost Base.

*A8 Line 9 Installation of denitrification at existing secondary works, p.e. 40,000*

SW notes that wastewater denitrification is uncommon in Scotland and that this type of work is not part of the 2010-14 Investment Plan

We believe that SW's statement is reasonable and consistent with the 2010-14 Investment Plan.

*A8 Line 14 Extension to existing conventional sludge treatment facility, additional throughput 3 ttds per annum*

SW notes that it does not have historical costs for sludge digestion and that this type of work is not part of the 2010-14 Investment Plan.

We believe that SW's statement is reasonable and consistent with the 2010-14 Investment Plan.

## **A4 SOURCES OF DATA AND METHODOLOGY**

### **A4.1 Introduction**

SW has prepared cost estimates for the Cost Base using the following source data and methodologies:

- Engineering Estimating System (EES) Cost Functions, see Section A4.3 below.
- ADP and SDP tendered rates, see Section A4.4 below.
- Estimates for work carried out as part of a planned maintenance programme, see Section A4.5 below.

For this submission SW has revised and updated its costing systems. It has increased the quantity of Q&S3A Capex 3 data used to populate cost functions in the EES, reducing the reliance on Q&S2 and legacy AR04 data used in the draft Cost Base. It has extended the use of EES cost functions to infrastructure standard costs.

A revised set of on-costs have been developed based on Q&S3A Capex 3 estimates which have been applied to all standard cost estimates. We have commented on these revised on-costs in Section A4.3.3.

We have described these estimating systems including direct and indirect costs in the following sub-sections of this report. This includes a commentary on where similar costing systems have been applied in the 2nd draft Business Plan and any general adjustments to the estimating systems or data to reflect the general or specific exclusions of the Cost Base.

In the subsequent sections on individual standard cost estimates we have identified the estimating system used and referred back to this section of the report for the general description of the estimating system. Where necessary, we have provided additional commentary in individual sections to address specific estimating issues relating to that item.

### **A4.2 Inflation Adjustment**

The standard cost estimates in the Cost Base have been prepared at a common COPI index figure of 162.5 as set out in the Cost Base Guidance.

The costing system incorporates cost data at the price base relevant to the individual source data. The costing system used to prepare the Investment Plan and the Cost Base generates estimates at a common COPI index of 161. The resulting estimates were adjusted to a COPI index of 162.5.

For non-infrastructure standard costs this final adjustment from 161 to 162.5 generally appears as a specific line item. For the infrastructure standard costs the direct cost estimates were adjusted to a COPI index of 162.5 before they were entered into the CBS.

### **A4.3 Engineering Estimating System Cost Functions**

#### ***A4.3.1 Overview***

Scottish Water has adopted a commercial software package, the “Engineering Estimating System” (EES), as the basis of SW’s capital cost estimating system. EES has a wide range of functionality and can record and collate costs and prepare estimates at different levels depending on the availability of data and the definition of project scope.

EES includes the ability to generate cost functions for direct costs against asset yardsticks. These cost functions are generated from a statistical analysis of individual project data points which are generated from an analysis of historic projects. In general, the data points are generated from CAPEX 3 level estimates, representing a tender level estimate of scope and price. In some cases SW has used CAPEX 2 feasibility study level estimates to populate selected curves.

Historic cost data used to develop the EES cost functions have been taken from the following sources:

- Q&S3A data. This was developed from the analysis of Capex 3 estimates in the Q&S3A programme. It has been used to develop cost functions for water mains and sewerage and non-infrastructure process units.
- Q&S2 data. This was developed from the analysis of target cost estimates from the Q&S2 programme. It has been used to develop the cost function for sewer rehabilitation.
- The legacy AR04 data set. This was developed from the analysis of historic projects of Scottish Water and its predecessor authorities. It formed the basis of the Scottish Water in-house estimating system used for the AR04 Cost Base and the capital maintenance elements of the SR06 Business Plan. Limited quantities of legacy AR04 data have been used to supplement Q&S3A data where this was necessary.

Where historic cost data is not available SW has developed cost functions from data points prepared for generic cost models (referred to as GAP models). These are bottom up estimates which have been scoped and priced in detail but have not necessarily been tested commercially against tender or out-turn prices.

The development and control of this part of the estimating system is described in greater detail in our report on the 2nd draft Business Plan estimating systems which forms Appendix G of the Reporter’s report.

#### ***A4.3.2 Direct costs***

Direct costs in EES are used to generate process unit cost functions. Individual data points with cost and process yardstick are prepared from the sources described above. Statistical best fit techniques are used to prepare cost functions relating direct cost to yardstick. SW has undertaken checks and reviews to control the quality of the underlying data and to exclude data outliers when developing the cost functions.

EES is generally populated with cost data at a more detailed level than the process unit level used to prepare cost functions. As a result it is possible to identify specific Cost Base and Non-Cost Base costs within individual process unit cost data points. This capability in EES has been used to prepare matching sets of process level cost data for the Cost Base and the Investment Plan, allowing matching cost functions to be prepared.

Where possible, separate Investment Plan and Cost Base data points were generated from the same detailed source data. All costs are included in the Investment Plan data points taking account of actual conditions relevant to that project. For the equivalent Cost Base data point, only costs required to meet the Cost Base specification were selected to reflect the general and particular exclusions of the Cost Base specification. For example: excavation on rock, onerous ground support or major dewatering would be excluded.

During our audit we reviewed this process and challenged the allocation of costs to the cost functions used to price the Cost Base. We concluded that some items identified by SW as Non-Cost Base were required by the Cost Base specification and should be included. We identified work necessary to complete the Cost Base which was not included in some of the historic data points used to populate the Cost Base functions.

SW responded to these concerns and made amendments to its costing system and Cost Base. In response to some areas of challenge SW carried out further internal checks and reviews and concluded that issues raised were not material. Where we continue to have concerns we have highlighted the specific issues in the detailed commentary below.

#### ***A4.3.3 Indirect costs including Scottish Water corporate on-cost and tender to outturn adjustment***

##### *Overview*

SW has substantially updated its assessment of on-costs for the 2<sup>nd</sup> draft Business Plan.

The revised on-costs are based on an analysis of on-costs in the SR06 project estimates which were used to update the costing system and which now dominate the base data used in the direct cost functions. As a result, the revised on-cost reflect current procurement practice and are consistent with the bulk of the data used to prepare cost functions.

The resulting change in on-cost percentages is a major part of the change in some of the standard cost estimates from the 1<sup>st</sup> draft Business Plan.

The EES estimating system allows for six levels of on-costs in addition to direct costs:

- Site specifics
- Construction management
- Design
- Risk
- Delivery Partner
- Scottish Water Management

For the purpose of the Investment Plan and the Cost Base the “Design” on-cost has been incorporated into the “Delivery Partner” on cost.

The on-cost percentages were based on the analysis of 345 SR06 Capex 3 estimates. To allow more robust estimates for different types and scale of work to be developed, a matrix of on-costs were developed covering five asset types and three levels of investment as follows:

Asset types	Levels of investment
Water infrastructure	Direct costs <250£k
Water non-infrastructure	
Sewerage infrastructure	Direct costs 250 to 500£k
Sewerage non-infrastructure	
UIDs	Direct costs >500£k

The analysis of on-costs is described in greater detail our report on Scottish Water’s costing systems (Appendix G of the Reporter’s report). In the remainder of this section we summarise the on-costs used and comment on on-costs used in the Cost Base compared to the Investment Plan.

The on-costs are described in the order they are applied as follows:

- Site specifics
- Construction management
- Delivery Partner
- Scottish Water management (corporate overhead)
- Risk (tender to out-turn)

The percentages noted below are cumulative and apply to the sum of the direct costs and the preceding on-costs.

*Site specific on-costs*

SW has developed site specific on-costs covering a range of site wide items.

In many cases these reflect items to be excluded from the Cost Base such as site drainage, roads, fencing and landscaping.

Other items such as the site MCC may be appropriate for some standard costs. For these items SW has either obtained specific cost estimates or used a cost function derived from the analysis of historic projects using direct cost as a yardstick. These items have been applied in the Cost Base estimates where required to complete the scope of works.

SW has combined the costs of other general site specific items such an inter-process pipework which may be required to comply with the Cost Base specification.

The following general site specific on-cost percentages have been adopted for the Cost Base where necessary to complete the scope of works:

Asset type	IDBP Cost Base on- cost	Direct Cost Range					
		< 250£k		250 – 500£k		>500£k	
		IP	CB	IP	CB	IP	CB
Water Infrastructure	0.00%	2.17%	0.00%	2.42%	0.00%	3.09%	0.00%
Water Non-infrastructure	0% - 3.88%	21.66%	17.55%	27.20%	19.87%	20.72%	<b>17.00%</b>
Sewerage Infrastructure	0.00%	9.03%	0.21%	16.34%	0.64%	9.39%	1.87%
Sewerage Non-infrastructure	0% - 7.22%	32.89%	<b>22.56%</b>	26.61%	19.54%	25.58%	20.00%
UID Schemes	0.00%	16.27%	4.69%	16.27%	4.69%	16.27%	4.69%
Note: the percentages highlighted are applied in the Cost Base							

The non-infrastructure site specific percentage has been applied to three items (Table 4 Line 7 and Table 8 Lines 10 and 11) where a number of interconnected processes are required. Other non-infrastructure items are single process units complete with all interconnection pipework and cabling.

#### *Construction management on-cost*

The following construction management on-costs have been adopted for the Cost Base:

Asset type	IDBP Cost Base on- cost	Direct Cost Range					
		< 250£k		250 – 500£k		>500£k	
		IP	CB	IP	CB	IP	CB
Water Infrastructure	29.22%	26.17%	<b>26.53%</b>	26.22%	27.29%	23.93%	20.06%
Water Non-infrastructure	27.59%	34.75%	<b>34.75%</b>	32.99%	<b>32.99%</b>	29.60%	<b>29.60%</b>
Sewerage Infrastructure	29.22%	34.17%	<b>32.36%</b>	33.50%	29.32%	33.65%	31.16%
Sewerage Non-infrastructure	27.59%	29.96%	<b>29.96%</b>	31.25%	<b>31.25%</b>	28.37%	28.37%
UID Schemes	27.59%	44.12%	<b>44.12%</b>	44.12%	<b>44.12%</b>	44.12%	44.12%
Note: the percentages highlighted are applied in the Cost Base							

SW has not adjusted the construction management on-costs to represent “easy” projects.

The minor difference between the Investment Plan and Cost Base construction management on-cost percentages reflect a minor difference in the project sets used to derive the on-costs. For the Investment Plan SW has used a range of infrastructure projects including some with a material non-infrastructure element such as pumping stations. For the Cost Base SW has excluded projects with a material non-infrastructure element from the infrastructure on-cost analysis to reflect the fact that the infrastructure Cost Base relates exclusively to pipes, fittings and chambers.

*Delivery Partner on-cost*

The following Delivery Partner on-cost percentages have been adopted for the Cost Base:

Asset type	IDBP Cost Base on- cost	Direct Cost Range					
		< 250£k		250 – 500£k		>500£k	
		IP	CB	IP	CB	IP	CB
Water Infrastructure	11.91%	12.55%	<b>11.58%</b>	15.77%	10.97%	15.79%	15.10%
Water Non-infrastructure	16.69%	41.47%	<b>41.47%</b>	40.03%	<b>40.03%</b>	31.27%	<b>31.27%</b>
Sewerage Infrastructure	11.91%	30.03%	<b>27.49%</b>	23.70%	18.45%	27.12%	23.58%
Sewerage Non-infrastructure	16.69%	38.78%	<b>38.78%</b>	36.96%	<b>36.96%</b>	29.22%	29.22%
UID Schemes	16.69%	41.51%	<b>41.51%</b>	41.51%	<b>41.51%</b>	41.51%	41.51%

Note: the percentages highlighted are applied in the Cost Base

SW has not adjusted the delivery partner on-costs to represent “easy” projects.

The minor difference between the Investment Plan and Cost Base construction management on-cost percentages reflect a minor difference in the project sets used to derive the on-costs. For the Investment Plan SW has used a range of infrastructure projects including some with a material non-infrastructure element such as pumping stations. For the Cost Base SW has excluded projects with a material non-infrastructure element from the infrastructure on-cost analysis to reflect the fact that the infrastructure Cost Base relates exclusively to pipes, fittings and chambers.

*Scottish Water management (corporate on-cost)*

The following Scottish Water management (corporate) on-cost percentages have been adopted for the Cost Base:

Asset type	IDBP Cost Base on- cost	Direct Cost Range					
		< 250£k		250 – 500£k		>500£k	
		IP	CB	IP	CB	IP	CB
Water Infrastructure	4.45%	2.90%	<b>2.22%</b>	3.26%	2.20%	3.40%	2.47%
Water Non-infrastructure	4.45%	5.17%	<b>3.73%</b>	5.44%	<b>4.35%</b>	4.99%	<b>4.63%</b>
Sewerage Infrastructure	4.45%	3.64%	<b>3.25%</b>	4.29%	2.72%	7.08%	4.14%
Sewerage Non-infrastructure	4.45%	4.79%	<b>4.48%</b>	4.56%	<b>4.30%</b>	4.57%	4.40%
UID Schemes	4.45%	4.83%	<b>4.29%</b>	4.83%	<b>4.29%</b>	4.83%	4.29%

Note: the percentages highlighted are applied in the Cost Base

The Cost Base on-cost percentages are based on the same data as the Investment Plan on-cost percentages subject to the following amendments:

- The data set for infrastructure items was reduced to exclude projects with material non-infrastructure elements such as pumping stations.

- Legal, land and compensation costs incurred by Scottish Water were excluded from the Cost Base on-cost percentage.

*Risk (tender to out-turn) on-cost*

The following Risk (tender to out-turn) on-cost percentages have been adopted for the Cost Base:

Asset type	IDBP Cost Base on- cost	Direct Cost Range					
		< 250£k		250 – 500£k		>500£k	
		IP	CB	IP	CB	IP	CB
Water Infrastructure	5.05%	13.59%	0.00%	14.48%	0.00%	10.63%	0.00%
Water Non-infrastructure	5.05%	8.49%	1.65%	12.38%	3.51%	18.08%	0.30%
Sewerage Infrastructure	5.05%	13.31%	0.52%	8.25%	2.31%	16.42%	0.00%
Sewerage Non-infrastructure	5.05%	21.37%	3.06%	13.58%	2.35%	9.43%	1.19%
UID Schemes	5.05%	14.34%	1.02%	14.34%	1.02%	14.34%	1.02%

Note: the percentages highlighted are applied in the Cost Base

SW has identified risk under 5 main categories which are described below. The risk on-costs have been developed from the project risk registers prepared at Capex 3. Only the “Client Based risk” has been included in the Cost Base on-cost.

- “Construction Based” risk (contractor’s generic risks). These are a set of common construction risks such as extreme weather or unforeseen ground conditions which are identified in the ADP contracts. A tendered percentage is added to the target cost to cover these risks. We believe that this type of risk is excluded by the Cost Base specification. Its omission should be noted during any moderation against other companies.
- “Site Based” risk (contractor’s specific risks). These are risks accepted by the contractor in their target cost agreement with the Delivery Partner over and above the construction based risk covered by a tendered percentage described above. These are generally specific site risks which the contractor is better placed to manage than the Delivery Partner or the Client. They tend to represent atypical items which can reasonably be excluded from the Cost Base.
- “Design Based” risk (all risks retained by the Delivery Partner). This is the element of risk accepted by the Delivery Partner as part of the service agreement. A key element of this risk is the development of the project from Capex 3. This includes the impact of the detailed design on the scope of works and can include individual items of scope which may be needed to complete the works. We are concerned that part of this risk allowance represents scope of works arising from detailed design development which should be included in the Cost Base.
- Risk General. This is primarily a balancing item between early estimates prepared by ADP contractors used for Capex 3 and final estimates prepared using the EES system which formed the basis of contractor target costs. The balance remained as a risk item with the Delivery Partner. We believe that this risk items represents a nominal

adjustment item as opposed to the cost of the scope of works and we agree with SW that it should not be included in the Cost Base. However, for the same reason, we concluded that the “Risk General” adjustment should also be excluded from the Investment Plan estimates. We suggest that its omission should be considered during any moderation against other companies as it is possible that other companies take a similar approach. SW has responded that it believes that this reflects actual costs incurred in the delivery of the SR06 programme and should therefore be included in the Investment Plan.

- Client Based risk (risks retained by Scottish Water). This category includes the risks which remain with the Client. Client risk included in Cost Base includes commissioning delays (withholding acceptance); and if the existing condition of an asset undergoing capital maintenance or enhancement has hidden defects unknown to the contractor. This is the sole risk item included in the Cost Base.

#### ***A4.3.4 Pain-gain adjustment***

Scottish Water has not made any allowance in the estimates for pain-gain payments under incentivised target cost contracts for Q&S2 or Q&S3A. This is consistent with the approach adopted for the 2010-14 Investment Plan.

Scottish Water has demonstrated that current experience suggests that out-turn costs and latest best estimates to completion for the SR10 programme are consistent with the Capex 3 estimates and no major pain/gain payments are expected.

#### ***A4.3.5 Contingency Allowance***

Scottish Water has undertaken calibration work which applies the estimating system to historic projects to determine the variance from estimate to outturn and introduce a calibration estimate if appropriate. At the time of our audits, this work was in progress but SW considered that work completed to date was not sufficiently robust to draw any conclusions on which to adjust the Investment Plan estimates.

Scottish Water has not made any additional contingency allowance at project or programme level in the Investment Plan or the Cost Base other than the on-cost allowances described above.

#### ***A4.3.6 Allocation of indirect costs for the CBS***

The structure and allocation of on-costs used in the Investment Plan and Cost Base estimates does not align directly with the type and structure of on-costs set out in the Cost Base CBS sheets.

To complete the CBS sheets SW undertook a further analysis of current and historic project on-costs to provide a mechanism to distribute on-costs over the in-direct cost categories included in the CBS. Based on this analysis, the individual on-costs were distributed as follows:

	Construction Management	Delivery Partner	Scottish Water	Risk
<b>3a. Indirect costs</b>				
Design (inception to detailed design)	1.65%	42.76%		
Commissioning	0.73%			
Project management (including planning and quality audits)		57.24%		
Construction management (including prelims, site supervision, site overheads)	97.62%			
<b>3b. Adjustments</b>				
Pain/ gain		0.00%		
Tender / outturn				100.00%
<b>4. Corporate overheads</b>				
Programme planning			44.58%	
Management of delivery of the whole capital programme			55.42%	
Capitalised building costs (offices, stores)				
Other capitalised items (e.g. vehicles)				
	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>	<b>100.00%</b>

The percentage allocation of Construction Management and Delivery Partner on-costs between the CBS categories set out above was based on costs from 898 projects with an estimated out-turn value of £882 million, providing a substantive project set as the basis of the analysis.

The allocation of Construction Management costs is based on a data set which includes all construction and procurement costs. The construction and procurement costs are allocated to the category for “Construction management (including prelims, site supervision, and site overheads)”. This distorts the analysis, increasing the percentage allocated to construction management and reducing the percentages allocated to design and construction. The distribution of costs between these categories does not impact on the overall standard cost estimate.

The allocation of Delivery Partner costs is based on a data set which includes risk and contingency which are also considered separately under the risk category. The risk and contingency costs are included in the category for “Project Management”, increasing this percentage at the expense of design. The distribution of costs between these categories does not impact on the overall standard cost estimate.

The allocation of corporate overheads is based on corporate costs allocated to the capital programme over the period April to October 2008. The cost of Scottish Water’s Tactical Performance and Planning team was allocated to “Programme Planning”. All other costs were allocated to “Management and delivery of the whole capital programme”.

The risk element of the Cost Base has been allocated to tender to out-turn adjustment.

We have checked and confirmed that the overall allocation of on-costs represents the on-cost percentages calculated by Scottish Water based on historic project costs as described in

Section A4.3.3 above. We have also checked and confirmed that the on-costs have been distributed in accordance with the methodology and percentages set out above.

We note the assumptions underlying the distribution of on-costs in the CBS sheets and weaknesses in the analysis described above. We note that other companies in England & Wales will also have made assumptions regarding the distribution of on-costs based on their procurement policies and available data. This is likely to result in materially different allocations of cost between individual in-direct cost categories and also to material differences in the split between direct and indirect costs for different companies. We recommend that inter-company comparisons of individual cost components should be treated with caution.

## **A4.4 ADP Tendered Rates**

### ***A4.4.1 Overview***

As part of its procurement of contracting services for Q&S3A, Scottish Water obtained tenders from “Associate Delivery Partners”. These formed the basis of frameworks under which Scottish Water can let individual target cost contracts.

The ADP tendered rates are incorporated in EES and are used to prepare the Capex 3 target cost estimates which are the basis of much of the cost data used to prepare the EES cost functions described above.

Scottish Water has also used direct cost rates from the ADP tenders to contribute to estimates of the following:

- The bottom up estimates for CSO storage tanks and CSO chamber for Table 8 Lines 1, 2 and 3.
- The bottom up estimates for new and refurbished service reservoirs in Table 4 Lines 10 and 11.
- The bottom up estimate for rapid gravity filter refurbishment in Table 4 Line 8.

Scottish Water entered into framework contracts with eight ADPs with a further framework contract focused on water infrastructure.

As part of the tender process the ADP tenderers completed detailed schedule of rates for a series of work items closely aligned with the Cost Base standard cost definitions for SR06. Some additional “non Cost Base” items were added to ensure that the tendered rates would be reasonably comprehensive. A scope of works and a detailed bill of quantities were prepared for each item by Scottish Water and estimates of the plant, labour and materials required to complete each item were also prepared by Scottish Water.

Tenderers priced the plant, labour and material schedules and tendered productivity rates to complete the scope of works. These tendered rates generate rates against the bill of quantities and the individual items. Tendered percentages were also provided for a range of on-costs

including site facilities, site management, management fee and certain risks accepted by the tenderer.

#### **A4.4.2 Direct costs**

Scottish Water has based its standard cost estimates on a selected tender from the range of ADP tenders available. For the first draft Cost Base. Scottish Water completed a study of the ADP framework rates against the five areas of work: water quality, capital maintenance and resources, wastewater quality, quality UID and capital maintenance. From this they determined the third lowest average cost for each type of work and used this ADP's tendered rates for the purpose of the Cost Base. SW has generally adopted the same tender rates for the revised Cost Base submission.

The tendered rates were valid at March 2005. The tenders allow for rates to be inflated by the lesser of RPI or COPI. The tendered rates have been inflated by a factor of 1.0980 calculated as follows:

	<b>March 2005</b>	<b>Mid 07/08</b>	<b>Inflation factor</b>
Based on COPI indices	148	162.5	1.0980
Based on RPI indices	190.5	208.6	1.0950

The indirect costs, including Scottish Water corporate on-cost and tender to outturn adjustment, added to the ADP tender costs are those set out in Section A4.3.3 above.

SW has applied the on-costs described in Section 3.3.3 above to direct cost rates derived from the ADP tenders.

### **A4.5 Estimates for work carried out as part of a Planned Maintenance Programme**

#### **A4.5.1 Overview**

SW has prepared some estimates on the basis that the work will be carried out as part of a planned maintenance programme.

These estimates are typically prepared as bottom up estimates. In many cases the estimates rely on framework supplier quotations and productivity rates based on the experience of the estimator. We accept that framework contractors and framework labour rates have been used to develop the standard costs.

This approach has been adopted for the pumping plant standard cost estimates in Tables 4 and 8 and the plant replacement costs in Table 4 Lines 4 and 9 and Table 8 Lines 12, 13 and 14.

#### **A4.5.2 Direct costs**

Direct costs of major plant items have generally been obtained from quotations from framework suppliers currently employed by Scottish Water. The framework suppliers are asked to supply the quotation as they would for other cost estimates. Installation and

commissioning costs have been obtained from Scottish Water's Cost Consultant's estimators, assisted by technical staff that have the necessary expertise.

#### ***A4.5.3 Indirect costs including Scottish Water corporate on-cost and tender to outturn adjustment***

SW has applied the on-costs described in Section A4.3.3 above to the direct costs including supplier quotations used to price work carried out as part of a planned maintenance programme.

We note that the on-costs are now much closer to tendered on-costs for capital maintenance projects.

We challenged Scottish Water as to why it based its overhead percentage on an average overhead while a capital maintenance project of the sort in the standard costs was unlikely to attract certain on-costs such as design costs in the same way as other programmes. Scottish Water responded that it was difficult to isolate on-costs for different programmes and that it had decided to apply average on-costs for both the Investment Plan and Cost Base.

We conclude that the on-costs for the capital maintenance projects in Table 4 lines 13 and 14 and Table 8 lines 4 to 7 may be higher than actually incurred while those in some other lines may be lower. However, we accept that the revised on-costs are now much more in line with those in the Investment Plan.

We believe that the inclusion of different categories of on-costs by different water companies can lead to significant uncertainty in any Cost Base comparison between companies. We believe that regulators should carefully expose all estimates of on-costs used by all companies to ensure fairness in the comparisons.

## **A5 SPECIAL FACTORS**

Scottish Water has not made any claim relating to special factors which might affect the comparability of its Cost Base submission with similar submissions from other companies in England & Wales.

## A6 INDEPENDENCE OF SW ESTIMATES

Based on our sample audits we believe that SW has compiled its standard cost submissions independently of other water and sewerage companies.

Much of the cost data used to develop the standard costs has been derived from the following generic sources:

- EES cost functions based on the analysis of projects undertaken by Scottish Water in the past.
- ADP tender rates which form the basis of estimating target costs for work currently being undertaken in the Q&S3A programme.
- Specific supplier quotations, generally from current framework suppliers.

A limited number of standard costs have been priced where SW does not have recent experience or historic cost data. In these circumstances SW's standard costs rely on specific quotations from suppliers. It is possible that other companies are in a similar position and have sourced information from the same suppliers resulting in standard cost estimates which are not truly independent. However, Scottish Water has generally been able to demonstrate that quotes received are from current framework suppliers or are consistent with current tendered prices.

## **A7 WATER INFRASTRUCTURE STANDARD COSTS (TABLE 2)**

### **A7.1 Overview**

Scottish Water has completed standard costs for mains laying, main rehabilitation and renewing communication pipes. SW has not completed standard cost estimates for directional drilling, new communications pipes and new or renew household meters.

### **A7.2 Block A - Mains laying**

#### ***A7.2.1 Key Points***

1. The estimate has been costed using the Engineering Estimating System cost functions described in Section A4.3 above.
2. Scottish Water has assumed that excavated material in highways is granular and can be used to backfill trenches. We recommend that WICS considers this assumption against those made in other standard cost estimates used in the efficiency comparison.

#### ***A7.2.2 General information***

SW has based the standard cost estimate on EES cost functions which aim to capture the Cost Base specification and exclusions for mains laying generated from Q&S3A Capex 3 project estimates.

During the audit we reviewed these Cost Base function and followed a sample of data points back to the Capex 3 estimate and from this to the framework rates supplied by the ADP contractor.

The project estimate sheets were broken down into non Cost Base and Cost Base processes. We confirmed the non Cost Base items were excluded from the Cost Base function. We also confirmed that a similar set of data points, inclusive of the non Cost Base items, had been used to prepare the cost functions used for the Investment Plan.

The Cost Base items examined are rates for pipes with 900 mm cover to soffit and therefore it has not been necessary to make any adjustments to comply with the depth requirements of the Cost Base specification. Where the specific pipe is at greater depth there is a non Cost Base rate for each additional 500mm depth and we confirmed this was excluded from the Cost Base function.

The standard cost estimates are based on pipes pressure rated to 10 bar.

By excluding all non Cost Base processes it has been possible to comply with the detailed exclusions of the Cost Base specification such as ground conditions, over-pumping, un-charted services and contamination of excavated materials.

The specification requires trenches in highways to be refilled with granular material. Scottish Water assumes that the excavated material will be granular and can be used to refill trenches in highway. Costs are included for placing granular material but not for importing granular

material. We recommend that WICS considers this assumption with assumptions made in other standard cost estimates used in the efficiency comparison.

Costs associated with health and safety and environmental regulations are included in the contractor's overheads.

Non-complex trench dewatering is included in the general excavation rates and no specific allowance has been included for trench dewatering.

The ADP tendered rates used to cost the Cost Base allow for the disposal to landfill 1 km away as required by the Cost Base specification. No adjustment has been necessary for distance to landfill.

While the CBS sheet is costed using a length of 2000m the tender data used to cost the work is not length dependent. We understand that the tender rates would not be varied for length of water main installed, with contractors expected to accept the balance of risk over a portfolio of work. It would be possible to base the standard cost estimates on longer lengths to take account of lower unit costs of production based on higher productivity rates. We recommend that WICS considers this assumption against assumptions made in other standard cost estimates used in the efficiency comparison.

Scottish Water has deducted all pipe fittings from the Capex 3 estimates used for the Cost Base functions. Scottish Water has then added back the number of fittings at the frequencies required by the Cost Base specification. This adjustment was carried out using a spreadsheet which we have examined in detail, concluding that SW had complied with the Cost Base specification in respect of fittings.

The standard cost estimates allow for reinstatement priced at rates included in the ADP tenders for roads and grassland. This allows for permanent reinstatement on backfill of the trench without the need for temporary reinstatement. Scottish Water has confirmed that this is its policy and practice. The ADP tendered rates in grassland assumes a 3m working strip.

### ***A7.2.3 Direct costs***

The Cost Base function has been developed using ADP tender rates as described in Section A4.3.2 above. The same tender rates have been used to develop cost functions for the MEAV.

The ADP rates of March 2005 at a COPI of 148 were inflated to mid construction date for each project estimate and then to COPI of 162 for the cost model extracted from EES. These were then decreased to COPI of 161 for the Cost Base function and then to 162.5 for the Cost Base standard cost. We confirmed this calculation for a selection of the EES data points.

The Cost Base cost functions were developed from all available and appropriate Capex 3 estimates. It includes estimates of projects from various regions and from the various ADP contractors. It is therefore representative of the balance of work across Scotland.

When preparing Capex 3 estimates SW replaces pipe material rates by framework supply rates available to its ADP contractor's. This approach has been carried in to the Cost Base and Investment Plan cost estimates.

#### ***A7.2.4 Adjustments and exclusions***

The value of the non-Cost Base processes included in the Investment Plan cost functions but excluded from the Cost Base function has been broken down into the various categories stated by WICS on the Cost Base Structure sheets.

We understand that Scottish Water identified a Capex 3 estimate at each of the four CBS sizes. For these selected estimates it calculated the proportion of Cost Base and non-Cost Base items and applied these proportions to calculate the exclusions reported in the CBS. This was carried out after our audit and we have not tested the application of this methodology. We are not convinced that this methodology, based on a limited sample of data, will give a particularly reliable estimate. We recommend that the value of exclusions and adjustments should be treated with caution in any comparison.

#### ***A7.2.5 Indirect costs***

The indirect costs applied to the standard cost estimates (including Scottish Water corporate overheads) are those described in Section A4.3.3 above.

#### ***A7.2.6 Corporate overheads***

The corporate overheads described in Section A4.3.3 above have been applied.

#### ***A7.2.7 Confidence grade – Reporter assessment***

Our assessment of the confidence grades are set out below. SW has applied the same grades to the three pipe laying areas and our comments apply to the three areas:

<b>Criteria</b>	<b>Company</b>	<b>Reporter Commentary</b>	<b>Reporter</b>
Scope	5	Scottish Water has broad experience of similar work.	5
Cost	4	The costs are based on ADP rates only but a significant proportion of projects are carried out by non-ADP contractors.	4
Risk	3	All costs are based on Capex 3 Target Costs and not on constructed out-turn costs.	3
Compliance	4	We have noted issues above regarding compliance with the Cost Base specification in respect of backfill in highways.	4

### **A7.3 Block B - Mains laying by directional drilling**

SW notes that its forecast expenditure is <2% of expenditure in the activity area and that it does not have historic cost data for this method.

We believe that SW's statement is reasonable and consistent with the 2010-14 Investment Plan, although we believe that some limited directional drilling is being carried out in SR06.

## **A7.4 Block C - Mains rehabilitation by surface applied internal coating.**

### **A7.4.1 Key Points**

1. SW has completed standard cost estimates for mains rehabilitation by epoxy coating.
2. The estimate has been costed using the Engineering Estimating System cost functions described in Section A3.3 above.
3. The framework rates are representative of the current Cost Base for this work.

### **A7.4.2 General information**

The scope of works included the following:

- Re-lining using the epoxy coating lining technique
- Costed length is for 2000m of pipe with 30 number access pits
- Swabbing, disinfection and testing
- Dealing with minor serves and any traffic management

SW has based the standard cost estimate on EES cost functions which aim to capture the Cost Base specification and exclusions for mains laying from Q&S3A Capex 3 project estimates.

During the audit we reviewed these Cost Base function and followed a sample of data points back to the Capex 3 estimate and from this to the framework rates supplied by the ADP contractor.

The project estimate sheets were broken down into non Cost Base and Cost Base processes. We confirmed the non Cost Base items were excluded from the Cost Base function. We also confirmed that a similar set of data points, inclusive of the non Cost Base items, had been used to prepare the cost functions used for the Investment Plan.

From our audit of the EES Capex 3 estimates used to develop the Cost Base cost function we concluded that they complied with the detailed exclusions of the Cost Base specification such as ground conditions, over-pumping, un-charted services and contamination of excavated materials.

Costs associated with health and safety and environmental regulations are included in the contractor's overheads and not a direct cost which is reasonable.

The ADP tendered rates used to cost the Cost Base allow for the disposal to landfill 1 km away as required by the Cost Base specification. No adjustment has been necessary for distance to landfill.

The tender rates used to cost the work are not length dependent. We understand that it would not be varied for length of water main installed with contractors expected to accept the balance of risk over a portfolio of work. It would be possible to base the standard cost estimates on longer lengths taking account of lower unit costs of production based on higher productivity rates. We recommend that WICS considers this assumption with assumptions made in other standard cost estimates used in the efficiency comparison.

Scottish Water are reviewing whether it is more efficient to use polyurethane coating rather than epoxy coating in SR10 and to this end have obtained quotes to be used in the Cost Base analysis. They found these quotes were higher than anticipated and do not consider them reliable from discussion with other water authorities. Because of this they retained the ADP rates for epoxy lining for the 2<sup>nd</sup> draft Business Plan Cost Base.

#### **A7.4.3 Direct costs**

The standard cost estimate has been priced using a Cost Base cost function developed from ADP tender rates with non Cost Base rates excluded as described in Section A4.3.2 above.

The standard cost has been inflated from the original ADP rates to COPI 162.5.

The Cost Base cost functions were developed from all available and appropriate Capex 3 estimates. It includes estimates of projects from various regions and from the various ADP contractors. It is therefore representative of the balance of work across Scotland.

#### **A7.4.4 Adjustments and exclusions**

The Investment Plan cost function is used to determine the average cost of this type of work. The difference between the Cost Base function and the Investment Plan function is given for information.

The fittings included in the Capex 3 data points have been removed and replaced with the Cost Base specified quantities. Where available the cost of fittings and materials used in the Capex 3 estimates is used for the replacement costs. This allows for inclusion of framework fittings and materials costs and appears reasonable. The spreadsheet used to alter the fittings also adjusted for inflation to COPI of 162.5.

#### **A7.4.5 Indirect costs**

The indirect costs applied to the standard cost estimates (including Scottish Water corporate overheads) are those described in Section A4.3.3 above.

#### **A7.4.6 Corporate overheads**

The corporate overheads described in Section A4.3.3 above have been applied.

#### **A7.4.7 Confidence grade – Reporter assessment**

Our assessment of the confidence grades for pipe relining is set out below:

<b>Criteria</b>	<b>Company</b>	<b>Reporter Commentary</b>	<b>Reporter</b>
Scope	5	Scottish Water has broad experience of similar work.	5
Cost	4	The costs are based on Target Costs and not Out-Turn constructed costs. Scottish Water anticipates moving to polyurethane coatings for SR10 which they expect to be lower than the current epoxy costs.	3
Risk	3	The on-costs used are not specific to this particular type of work but they do relate to only water infrastructure. The cost is not for completed work.	3
Compliance	4	We believe that SW has complied with the standard cost specification.	4

## A7.5 Block C - Mains rehabilitation by pipe insertion

### A7.5.1 Key Points

1. SW has completed the three standard costs for mains rehabilitation by pipe insertion using slip-lining techniques.
2. SW has assumed that slip-lining will be carried out from access pits in grassland.
3. SW has adjusted the data points in the Cost Base cost model to reflect the required fittings frequency.
4. The standard cost rates are stated per metre.

### A7.5.2 General information

The cost estimates based on PEF cost functions where the yardstick is the external pipe diameter. SW has applied to following external pipe diameters to reflect the nominal pipe diameters required for the Cost Base:

Cost Base nominal diameter	External diameter costed
100	110
150	160
200	250

SW has based its standard cost on relining a pipe length of 2000 m. However, the relevant cost function yields a price per metre based on pipe diameter as a cost driver and the length of pipe costed does not have an impact on the standard cost.

The standard cost estimate has been priced using a Cost Base cost function developed from ADP tender rates with non Cost Base rates excluded as described in Section A4.3.2 above.

During our audit we reviewed the inclusions and exclusions from the Cost Base. We noted that the rate audited included temporary fencing, traffic management, survey of the pipe before and after pipe insertion, access pits and pipe fittings as well as the slip-lining itself.

The cost base exclusions covered the use of imported granular backfill for access pits, access pit reinstatement in roads, connections, an extra over labour item (which appears to be based on an assumption regarding productivity) and pre-cleaning the pipe prior to pipe insertion.

Based on these exclusions, SW has assumed that the Cost Base rate should be based on pipe insertion where access pits can be located in grassland SW has also excluded additional labour costs included in the estimate to address constraints which the project estimator considered to be atypical.

The investment plan cost function and the cost base cost functions are reasonably well populated with approximately 50 data points in each. The data is concentrated on pipe diameters up to 160 mm diameter with limited data available for larger diameters.

SW has interpreted the Cost Base specification as requiring it to develop a specific algorithm to cover the range of diameters in the Cost Base specification. The algorithm for the investment plan covers a greater range of pipe diameters leading to some differences in costs for those sizes covered by the Cost Base, thereby breaking the direct link between two sets of costs. This interpretation may have been made by other companies.

The cost functions for slip-lining include access pits and fittings. For the Cost Base, SW has standardised the frequency of access pits and fittings to reflect the Cost Base specification. This was done for each data point by increasing or reducing the number of fittings with the change in fittings valued using unit rates from the same project. Where the required fitting was not used on a particular project, average rates from other projects were used to calculate the costs of the required fittings.

#### ***A7.5.3 Direct costs***

The standard cost estimate has been priced using a Cost Base cost function developed from ADP tender rates with non Cost Base rates excluded as described in Section A4.3.2 above.

The standard cost has been inflated from the original ADP rates to COPI 162.5.

The Cost Base cost functions were developed from data derived from projects from various regions. It is therefore representative of the balance of work across Scotland.

#### ***A7.5.4 Indirect costs***

The indirect costs applied to the standard cost estimates (including Scottish Water corporate overheads) are those described in Section A4.3.3 above.

#### ***A7.5.5 Corporate overheads***

The corporate overheads described in Section A4.3.3 above have been applied.

#### ***A7.5.6 Confidence grade – Reporter assessment***

Our assessment of the confidence grades for mains rehabilitation by pipe insertion is set out below:

<b>Criteria</b>	<b>Company</b>	<b>Reporter Commentary</b>	<b>Reporter</b>
Scope	5	Scottish Water has broad experience of similar work.	5
Cost	4	Costs are based on cost functions derived from target cost estimates based on tendered rates.	3
Risk	3	The on-costs used are not specific to this particular type of work but they do relate to only water infrastructure. The cost is not for completed work.	3
Compliance	4	SW has complied with the Cost Base specification. We note the assumption that access pits are located in grassland.	3

## A7.6 Block D - Communication pipes

### A7.6.1 Key Points

1. SW has not completed the standard cost for new communication pipes.
2. The estimate has been costed using the Engineering Estimating System cost functions described in Section A4.3 above.
3. All data points used for the cost function are now Q&S3 data rather than the Q&S2 data used for the 1<sup>st</sup> draft Business Plan Cost Base.
4. The cost function is developed by excluding non Cost Base items rather than the factor applied at 1<sup>st</sup> draft Business Plan Cost Base which improves the accuracy of the function.

### A7.6.2 General information

#### *Table 2 Line 11: New communication pipes*

SW notes that this type of work is “Part 1” development where the work is carried out, and paid for, by the developer. As a result, it holds no cost data.

We believe that SW’s statement is reasonable and consistent with the 2010-14 Investment Plan. Scottish Water’s Guide for Obtaining New Water and Waste Water Services states that new communication pipes form part of the “Part 1” infrastructure which is constructed at the expense of the developer and does not form part of the reasonable costs contributions which Scottish Water makes towards the development of new infrastructure.

#### *Table 2 Line 12: Renew communication pipes*

Scottish Water did not prepare a specific scope of works for renewing communication pipes. Instead, SW has priced the standard cost for replacement communication pipes using a cost functions developed from a data set abstracted from Q&S3 target cost estimates.

A selection of the base data used to develop the communication pipe cost functions were examined. Two cost functions have been created: long side and short side. The standard cost reported is the average of long and short side rates.

### A7.6.3 Direct costs

The estimate has been costed using the Engineering Estimating System cost functions described in Section A4.3 above.

SW has priced the standard cost for replacement communication pipes from a data set abstracted from Q&S3 Capex 3 Target Cost estimates as opposed to out-turn costs.

The same data set was been used to develop a cost function for communication pipes which was used to price the main communication pipe replacement programme in the Investment Plan.

For 2<sup>nd</sup> draft a dedicated Cost Base function was developed by excluding non-Cost Base flagged items within EES. We believe that the exclusions applied are reasonable.

We note that the direct costs are for work carried out as part of a programme of water mains work. They might not be representative of costs of a programme of work targeted on communication pipe replacement only. A programme of communication pipe replacement may require additional work to locate the communication pipes and identify suitable candidates for replacement which is over and above that required for a planned programme of work.

The direct cost reported in the CBS is the cost of an average communication pipe cost and does not distinguish between long side and short side pipes.

#### ***A7.6.4 Adjustments and exclusions***

The value provided in the adjustments section is the difference between the Investment Plan cost function and the Cost Base cost function. The Cost Base cost functions are length specific and the adjustment represent the difference in the average cost and the Cost Base specific lengths.

#### ***A7.6.5 Indirect costs***

The indirect costs described in Section A4.3.3 for water infrastructure have been applied for projects less than £250k.

#### ***A7.6.6 Corporate overheads***

The corporate overheads described in Section A4.3.3 above have been applied.

#### ***A7.6.7 Confidence grade – Reporter assessment***

Our assessment of the confidence grades are set out below:

<b>Criteria</b>	<b>Company</b>	<b>Reporter Commentary</b>	<b>Reporter</b>
Scope	5	Scottish Water has experience of similar work on its mains rehabilitation programme.	5
Cost	4	Costs are based on target cost estimates based on tendered framework rates.	4
Risk	3	The on-costs are not specific to this particular type of work. The cost is not based on completed work.	3
Compliance	4	We believe SW has complied with the standard cost specification	4

### **A7.7 Block E – Household Meters**

SW notes that it does not propose investment in household meters in 2010-14.

We believe that SW's statement is reasonable and consistent with the 2010-14 Investment Plan. There has only been limited up take of domestic metering in Scotland. We understand

that there is no expectation that compulsory metering will be required to address water resource issues or associated environmental concerns.

## **A8 WATER NON-INFRASTRUCTURE STANDARD COSTS (TABLE 4)**

### **A8.1 Overview**

SW has completed the water non-infrastructure standard costs with the following exceptions:

- Line 1: New treatment works type SW4, output 30MI/d
- Line 3: New abstraction borehole treatment works with simple disinfection only, output 5MI/d
- Line 5: Alterations to water treatment works type SW2, output 30MI/d
- Line 6: Installation of a nitrate removal plant at a borehole treatment works with simple disinfection only, output 10MI/d
- Line 12: Replacement of variable speed pumps, output 6 to 9MI/d

In the following sections we provide comment on the standard cost estimates completed by SW and comment on SW's reasons for not completing the standard cost estimates noted above.

### **A8.2 Item A4.1 - New treatment works type SW4, output 30MI/d**

SW has not submitted a standard cost estimate for a new treatment works type SW4, output 30MI/d.

SW notes that its 2010-14 Investment Plan does not include any new treatment works of this size and type.

We believe that SW's statement is reasonable and consistent with the 2010-14 Investment Plan.

SW's suite of cost functions would allow it to cost a works of this type and size. However, because the Business Plan does not include work of this type and scale, these cost functions are not representative of the Business Plan. In the absence of similar projects of this degree of complexity in the SR10 Investment Plan it would be difficult to confirm that the process selection and design parameters used for a standard cost would be a reasonable and consistent with the SR10 Investment Plans. As a result, we believe that it is reasonable to omit this item from the Cost Base.

### **A8.3 Item A4.2 - Replacement filtration system at an existing water treatment works type SW2, output 20Ml/d**

#### ***A8.3.1 Key Points***

1. The estimate has been costed using the Engineering Estimating System cost functions described in Section A4.3 above.
2. The main cost function used to develop this standard cost is based partly on AR04 historic project data sets.
3. Where recent cost data was available, we concluded that SW had made reasonable exclusions to determine the Cost Base data points. However, in some cases the project data did not include items of scope required by the Cost Base specification and we recommend that the standard costs are reviewed to add these items to the estimate.
4. The denominator used is 20 Mld as set out in the Cost Base specification.

#### ***A8.3.2 General information***

The standard cost estimate is based on the following scope of works:

- A rapid gravity filter.
- A dirty washwater tank sized for two consecutive filter backwash.
- Dirty washwater return pumps.
- A new MCC.

A process design was undertaken following company standard practice to:

- Determine the flow through the filter block to take account of internal recycles and process losses which are added to the 20 Mld works output. SW has sized the filters for 20.5 Mld which will generate sufficient clean backwash water to wash each filter once per day. The design allows for one filter to be out of service for backwashing.
- Determine the size of the filter dirty backwash holding tank and recycle pumps. The dirty backwash tank has been sized to for two backwash volumes. Duty and standby return pumps have been provided. The pumps are sized to return the volume generated by washing all filters once per day over a 24 hour period.

The process design as described above appears to be reasonable and in line with SW's standard practice.

The rapid gravity filter has not been scoped in detail. The filter has been costed using a cost function based on historic project cost data. The yardstick for the cost function is total flow through the filters.

The cost function for the Rapid Gravity Filters includes five data points. Two data points are taken from SR06 projects where the estimate was developed in EES. The three other data points are legacy data points from the AR04 data set.

For the three legacy data points, the scope of work included in the standard cost estimates is the scope of work captured in the cost function which reflects the design philosophy and standards adopted at the time the underlying projects were completed. This may have considered higher or lower filtration rates than current design practice. It may have included greater provision of additional filter cells to cater for backwash.

Audit of one of the two Q&S3A data points in the cost function showed that the plant had a filtration rate of 10.6 m/hr with all filters in service compared with SW's design standard of 6 m/hr. As a result the cost relative to flow is lower than for a filter which meets SW's current design standard.

SW has not costed for a building to cover the filters. We understand that it is company standard practice to cover filters with a building. Scottish Water noted that the Cost Base specification states that "space exists for a replacement filtration plant to be built alongside the old plant". On the basis of this SW has assumed that there is space within an existing building for the new plant. We recommend that WICS considers this assumption against the assumptions made by comparative companies used to assess efficiency.

SW has made no specific allowance for a clean washwater tank. It is assumed that this is inherent in the Rapid Gravity Filter cost function. We have commented on the direct cost functions below. Based on our sample audit of underlying cost data points, we are not convinced that the standard cost estimate includes the full scope of clean backwash tanks.

SW has not made any specific allowance for a telemetry outstation. Telemetry is not specifically required by the Cost Base specification but there is a general requirement for instrumentation and controls associated with the filters etc. We recommend that WICS considers this exclusion against the assumptions made by comparative companies used to assess efficiency.

In general, uncertainty over the scope of works covered in the individual historic data points underlying the cost functions creates uncertainty in the standard cost estimate.

### **A8.3.3 Direct costs**

The estimate has been costed using the Engineering Estimating System cost functions described in Section A4.3 above.

Four cost models were used to prepare the estimate which contribute to the overall estimate as follows:

RGFX - RAPID GRAVITY FILTER	85.0%
WPSI - WATER PUMPING, IN-LINE PUMPS	1.2%
WWTX - WASH/WASTE WATER TANK	5.0%
MCPX - MAIN CONTROL PANEL	8.8%

The RGFX - Rapid Gravity Filter function includes 5 data points. Two data points are from Q&S3A projects which have a detailed EES estimate for the Investment Plan cost model and specific exclusions applied to generate the Cost Base cost model. During our audit we reviewed the Cost Base exclusions for this model data and believe that they are reasonable. SW has assumed that the three AR04 legacy data points used in the model are Cost Base data points.

We also reviewed the data points in the cost curve to determine whether it was inclusive of all work required for the Cost Base. In our previous audits we were concerned that one data point excluded the backwash storage and pumps associated with the filter plant. SW has adjusted the Cost Base RGF data point for this plant to include the backwash pumps. SW has not included the backwash storage tank in the RGF cost model.

During our initial audits we were not able to confirm whether the cabling associated with the one filter data point had been included in the cost model. SW has confirmed that that cabling cost had not been distributed properly and has reallocated cabling costs for this project. SW made this adjustment based on the allocation of cabling costs in another project. We note that the increase in one cost data point as a result of the reallocation of cable costs resulted in a movement in the cost function which reduced the standard cost estimate.

We note that the three AR04 legacy cost data points in the cost model appear to be materially higher than the two Q&S3A data points. It is not clear whether this is due to changes in efficiency, changes in design parameters or differences in the scope captured in the models (for example, the inclusion of buildings, clean water balancing tanks or the MCC, now captured as separate cost functions). The detail of the legacy data points has not been reviewed by SW to understand the difference.

The MCC cost function is a site specific function which uses the total direct cost of the works as a yardstick. The cost function data is highly variable. We believe that part of this variability represents fundamental differences in the projects used to populate the model. As a result we believe that the model should be used with caution. For example, the model includes UID projects which have a high direct cost of civils work but a relatively small MCC cost driven by the screen and pumping requirements of the project. As a result, we believe that further work would be undertaken to develop an MCC cost function which relates the specific requirements of the Cost Base specification. However, SW has applied the MCC model consistently in the Cost Base and the Investment Plan.

#### ***A8.3.4 Adjustments and exclusions***

SW calculates direct costs at a COPI index of 161. An adjustment is included to convert the direct costs to a COPI index of 162.5.

SW has made no further adjustments or allowances for site specific costs. A general site MCC is included in the direct costs.

No specific allowance has been made for interconnecting pipework. SW has captured process pipework within the direct cost functions. Only long lengths of inter-process pipework are captured as site specific costs. Based on our audit of SW's cost analysis we believe that the approach adopted by SW is reasonable.

**A8.3.5 Indirect costs**

The in-direct costs applied to this estimate (including corporate overheads) are described in Section A4.3.3. We understand that the percentages are applied as follows. The distribution of these costs between the categories set out in the CBS is described in Section A4.3.6.

Cost item	Percentage	Item cost	Cumulative cost
Total direct costs including site specifics		1,129,274.1	1,129,274.1
Contractor's on-costs	29.60%	334,265.1	1,463,539.2
Delivery partner on-costs	31.27%	457,648.7	1,921,187.9
SW corporate on-costs	4.63%	88,951.0	2,010,138.9
Tender to out-turn adjustment	0.30%	6,030.4	2,016,169.3

**A8.3.6 Corporate overheads**

The corporate on-costs are described with the indirect costs above.

**A8.3.7 Confidence grade – Reporter assessment**

Our assessment of the confidence grades are set out below:

Criteria	Company	Reporter Commentary	Reporter
Scope	4	Scottish Water has experience of similar work. However, the main RGF cost function is based on 5 data points.	4
Cost	3	Costs are based SW historic costs with few data points. The data points include AR04 data where audit trails are difficult to establish. It is not clear that the cost functions cover the full Cost Base specification.	3
Risk	3	A tender to outturn rate has been applied. This figure is specific to water non-infrastructure work.	3
Compliance	4	The estimate is based on a cost function rather than defined scope and there is some uncertainty as to whether this represents the specific cost base specification.	3

**A8.4 Item 4.3 - New abstraction borehole treatment works with simple disinfection only, output 5MI/d**

SW has not submitted a standard cost estimate for new abstraction borehole treatment works with simple disinfection only, output 5MI/d.

SW notes that the specific nature of this work (drilling a borehole in chalk) is not applicable in Scotland due to the geology of the area. Boreholes in Scotland tend to be in river gravels, the cost of which will not be comparable with chalk boreholes as the method of drilling and casing requirements are technically very different.

We confirm that many boreholes in Scotland are in gravel beds connected to river sources. We accept that there are differences in drilling in chalk and river gravels but do not believe

that these are material in terms of the standard cost estimate. We understand that new borehole sources do not form a material element of the 2010-14 Investment Plan and so believe that it is reasonable to omit this item from the Cost Base.

## **A8.5 Item 4.4 - Refurbishment of plumbosolvency control plant, output 8MI/d**

### ***A8.5.1 Key Points***

1. The direct costs for the estimate have been taken from a quotation from a framework supplier obtained specifically for the purpose of completing the Cost Base.
2. The denominator used is 8 Mld as set out in the Cost Base specification.

### ***A8.5.2 General information***

SW provided a copy of the Cost Base specification to a framework supplier for similar plant who was asked to price the works. The quotation received covers the scope of work set out in the Cost Base specification. The detailed interpretation of the scope of works was determined by the framework supplier.

### ***A8.5.3 Direct costs***

The direct costs for the estimate have been taken from a quotation from a framework supplier obtained specifically for the purpose of completing the Cost Base.

We challenged SW to demonstrate that the quotation obtained for the Cost Base was consistent with prices obtained for similar work in its normal course of business. In response SW provided a copy of the relevant framework agreement, and a summary document which detailed the source of the prices in the quotation in relation to the framework agreement

SW has deflated the current estimates obtained to price the works to mid 2007-08 prices using RPI.

### ***A8.5.4 Adjustments and exclusions***

SW calculates direct costs at a COPI index of 161. An adjustment is included to convert the direct costs to a COPI index of 162.5. Since the direct costs have already been deflated to mid 2007-08 prices based on RPI, we do not believe it was necessary to adjust the estimate from COPI = 161 to COPI = 162.5.

SW has made no further adjustments or allowances for site specific costs. The direct costs of the plant includes local cabling, local control panel and interconnecting pipework.

### ***A8.5.5 Indirect costs***

The in-direct costs applied to this estimate (including corporate overheads) are described in Section A4.3.3. We understand that the percentages are applied as follows. The distribution of these costs between the categories set out in the CBS is described in Section A4.3.6.

Cost item	Percentage	Item cost	Cumulative cost
Total direct costs including site specifics		31,352.2	31,352.2
Contractor's on-costs	34.75%	10,894.9	42,247.0
Delivery partner on-costs	41.47%	17,519.8	59,766.9
SW corporate on-costs	3.73%	2,229.3	61,996.2
Tender to out-turn adjustment	1.65%	1,022.9	63,019.1

#### A8.5.6 Corporate overheads

The corporate on-costs are described above.

#### A8.5.7 Confidence grade – Reporter assessment

Our assessment of the confidence grade is set out below:

Criteria	Company	Reporter Commentary	Reporter
Scope	4	Scottish Water has experience of similar work but has not been able to draw on this work to prepare the cost base.	3
Cost	3	Costs are based on a quotation obtained for the purpose of the Cost Base.	3
Risk	3	A tender to outturn rate has been applied. This figure is specific to water non-infrastructure work..	3
Compliance	4	The estimate is based on a specific quotation based on the Cost Base specification.	4

#### A8.6 Item 4.5 - Alterations to water treatment works type SW2, output 30MI/d

SW has not submitted a standard cost estimate for alterations to water treatment works type SW2, output 30MI/d.

This work relates to the provision of a membrane plant to provide a barrier against the transmission of cryptosporidium.

SW notes that the maximum output of a site covered by the DW23 programme is 11.5MI/d and that there is no work proposed at a 30MI/d site in 2010-14.

Work of this type, but not of this scale, is a significant feature of the 2<sup>nd</sup> draft Business Plan. Unlike the 1<sup>st</sup> draft business plan many of these are now categorised as “essential”. SW’s cost model for the key membrane process required to prepare this standard cost include data points up to 27 Mld. However, SW’s essential and desirable programmes only require plant of this type up to 11.5 Mld.

In view of the size of plant required for the second draft Business Plan, we consider that it is reasonable for Scottish Water to omit this item from its Cost Base submission.

**A8.7 Item 4.6 - Installation of a nitrate removal plant at a borehole treatment works with simple disinfection only, output 10MI/d**

SW has not submitted a standard cost estimate for the installation of a nitrate removal plant at a borehole treatment works with simple disinfection only, output 10MI/d

SW notes that it does not carry out nitrate removal and that this type of work is not part of the Investment Plan.

We believe that SW's statement is reasonable and consistent with the 2010-14 Investment Plan

**A8.8 Item 4.7 - Cryptosporidium protection to an existing borehole treatment works with simple disinfection only, output 2.5MI/d****A8.8.1 Key Points**

1. For the Final Cost Base, SW has reduced the assumed output of the membrane plant from 2.5 Mld to 2.48 Mld. SW has assumed that the output of the existing plant will remain at 2.5 Mld and that waste flow from the membrane plant will be 1% of the input, reducing the output to 2.48 Mld. Since SW's membrane cost model is based on output, the estimated cost of the plant has reduced.
2. The estimate has been costed using the Engineering Estimating System cost functions described in Section A4.3 above.
3. The main cost function used to develop this standard cost is based partly on AR04 historic project data sets. We believe that the cost functions used are reasonably robust subject to comments below. The cost functions used are consistent with the Investment Plan.
4. The denominator used is 2.5 Mld as set out in the Cost Base specification.

**A8.8.2 General information**

The standard cost estimate is based on the following scope of works:

- A membrane filtration plant.
- A process building containing the membrane plant.
- A water pumping station to boost the treated water into supply.
- Two pumping wet wells at the inlet and outlet to the new membrane plant.

A process design has been undertaken to determine the power rating of the pumping plant required to boost water into supply. Duty and standby pumps have been included in line with company standard practice. The assessment appears reasonable.

The cost model used to price the membrane plant is based on output flow. SW has assumed that the output of the existing plant will remain at 2.5 Mld and that waste flow from the membrane plant will be 1% of the input, reducing the membrane plant output to 2.48 Mld. This has resulted in a reduction in the standard cost from the Draft Final Cost Base which was based on a membrane output of 2.5 Mld.

The membrane plant has not been scoped in detail. The membrane plant has been costed using a cost function based on historic project costs. The cost function used is based on micro-filtration plant. This properly excludes the nano-filtration plant installed by SW in the past to cater for a combination of colour and cryptosporidium.

Inspection of recent data points in the cost curve confirms that they are inclusive of cleaning and testing plant; pumping plant; and all electrical and control equipment required to operate the membrane.

SW has allowed a building with a floor area of 210 m<sup>2</sup> to house the membrane plant based on information from the membrane supplier. SW has assumed that the existing site already has the required buildings for the existing disinfection and other current site needs so that the building only covers the new equipment

#### **A8.8.3 Direct costs**

The estimate has been costed using the Engineering Estimating System cost functions described in Section A4.3 above.

Four cost models were used to prepare the estimate which contribute to the overall estimate as follows:

MEMM - MEMBRANE FILTRATION PLANT, MICRO	75.7%
BLDP – PROCESS - BUILDING	13.1%
WPSI - WATER PUMPING, IN-LINE PUMPS	9.6%
WPWW - WELL, WET	1.6%

The membrane plant costs function was developed from historic cost data for five plant. SW has considered the project data points and has not identified any Cost Base exclusions.

The Process Building data points include a significant number of buildings which use other process units (say a Rapid Gravity Filter) as part or all of the building foundation and floor. The membrane building will require a complete foundation and floor. SW has not added back the costs of the additional building work. However, we note that SW's approach is consistent with the approach adopted to cost similar items in the Investment Plan.

SW has applied site specific on-costs to allow for interconnecting process pipework.

**A8.8.4 Adjustments and exclusions**

SW calculates direct costs at a COPI index of 161. An adjustment is included to convert the direct costs to a COPI index of 162.5.

SW has made no further adjustments or allowances for site specific costs. The direct costs of the plant includes local cabling, local control panel and interconnecting pipework.

**A8.8.5 Indirect costs**

The in-direct costs applied to this estimate (including corporate overheads) are described in Section A4.3.3. We understand that the percentages are applied as follows. The distribution of these costs between the categories set out in the CBS is described in Section A4.3.6.

Cost item	Percentage	Item cost	Cumulative cost
Total direct costs including site specifics		1,175,311	1,175,311
Contractor's on-costs	29.60%	347,892	1,523,204
Delivery partner on-costs	31.27%	476,306	1,999,509
SW corporate on-costs	4.63%	92,577	2,092,087
Tender to out-turn adjustment	0.30%	6,276	2,098,363

**A8.8.6 Corporate overheads**

The corporate on-costs are described above.

**A8.8.7 Confidence grade – Reporter assessment**

Our assessment of the confidence grade is set out below:

Criteria	Company	Reporter Commentary	Reporter
Scope	4	SW has experience of similar projects in similar size bands, basing the main membrane function on 5 historic data points.	4
Cost	4	SW has relied on reliable internal cost data with 5 data points available for the main membrane cost function.	4
Risk	3	A tender to outturn rate has been applied. This figure is specific to water non-infrastructure work..	3
Compliance	4	The estimates are based on cost functions applied at a process unit level but with cost data captured at sub-process level based on further granular data. We have challenged the inclusion of costs above.	4

## **A8.9 Item 4.8 - Refurbishment of rapid gravity filters, output 20MI/d**

### ***A8.9.1 Key Points***

1. SW has prepared a detailed scope of works for the standard cost which has been priced using a combination of ADP tender rates, framework tender prices for materials and services and estimates for labour inputs.
2. The scope of works is based on a flow rate of 20.5 Mld, allowing for 20 Mld output and filter losses due to backwashing.
3. SW has based the sizing of the filter on its standard filter loading rates and has priced 142.5 m<sup>2</sup> of filter areas in five cells.
4. The denominator used is 20 Mld as set out in the Cost Base specification.

### ***A8.9.2 General information***

Scottish Water produced a process flow diagram and list of inclusions and exclusions for the standard cost.

SW developed a detailed scope of works in response to the Cost Base specification based on typical filter blocks prepared for another company by one of its advisers. The scope of works took account of SW's internal "signature" solution for filters which is captured in a standard specification document and standard P&ID drawings.

SW undertook a process design to estimate the flow to the filter required to generate an output of 20 Mld. SW estimated recycle flows of 0.5 Mld from filter backwash and sized the plant for 20.5 Mld. We recommend that WICS confirms that this interpretation of the specification is consistent with the approach adopted for other standard costs used to assess efficiency

SW has sized the works on the basis of its standard filtration loading rates. The standard cost is for a filtration area of 142.5 m<sup>2</sup> in five cells, allowing for one cell to be out of service for backwash.

In line with the revised Cost Base specification, SW has allowed for the replacement of filter nozzles but not for the replacement of the lateral pipework or filter plenum floor.

SW has allowed for the replacement of a 200 mm thick gravel bed around the backwash nozzles in addition to the replacement of 600 mm of sand and 600 mm of anthracite filter media. We recommend that WICS confirms that the replacement of the gravel bed around the nozzles has been allowed for in the other standard costs used to assess efficiency.

SW has assumed that the filter media removed from the filters will not be disposed of off site. The rate is a bottom up estimate by Scottish Water's framework consultant and results in a rate of £31 per tonne for removal and disposal on site. SW's framework rate for the removal of media, including the disposal of inert material off site is £131 which implies a rate of £100 per tonne for disposal of inert material off site.

SW has assumed that the filter media will be delivered to site in 22 m<sup>3</sup> loads. We estimate that for sand delivered wet, this would be of the order of 40 tonne per load. We challenged

SW to demonstrate that this was a reasonable assumption for the supply of material to site. SW agrees that the number of loads should be 6 which would add £1730 to the standard cost.

The rates used to price the supply and disposal are for the Central Belt. Higher rates apply for other areas of Scotland.

A key risk of a detailed bottom up estimate is that it will not fully reflect the complexity and detail of a commercial estimate. For example, when reviewing SW's estimate we noted that no allowance was made for local control panels at each filter cell which were included in the estimate for construction of a filter block of a similar size. The specification requires that the standard cost includes "MCC for all new plant (pump, blower and actuator starters and VSDs) and control system including panel(s) local to filters, plant level plc(s) and interface to existing site SCADA system but excluding modifications to existing SCADA software. SW has been assumed that local control panels are already existing, and that the Standard Cost guidance requires only the inclusion of a new MCC to facilitate the operation of the new plant and the existing control system including panel(s) local to filters etc. SW has advised us that the MCC included within our Standard Cost includes an ICA section for this purpose.

We challenged SW to demonstrate that the Cost Base estimate had been reviewed against work of a similar nature to confirm that the scope of work was comprehensive and the rates used to price the work were obtained in practice. SW responded that the installation allowances have been estimated using estimator judgement as they would be for real projects.

SW has not made any specific allowance for a telemetry outstation. This is not specifically required in the specification which has a general requirement for instrumentation and controls associated with the filters etc.

### ***A8.9.3 Direct costs***

The rates applied to the detailed scope of works were taken from a combination of ADP tender rates and framework contract for the supply of goods and services.

### ***A8.9.4 Adjustments and exclusions***

SW calculates direct costs at a COPI index of 161. An adjustment is included to convert the direct costs to a COPI index of 162.5.

SW has made no further adjustments or allowances for site specific costs. The refurbishment work is assumed to be defined in detail in the scope of works and no further additions are required for interconnecting pipework or general site electrics.

### ***A8.9.5 Indirect costs***

The basis and order of application of on-cost percentages is described in Section A4.5 above. The on-costs are not consistent with the derivation of direct costs through the EES cost functions used to price the standard costs which are described in Section A4.3 above.

The in-direct costs applied to this estimate (including corporate overheads) are described in Section A4.3.3. We understand that the percentages are applied as follows. The distribution of these costs between the categories set out in the CBS is described in Section A4.3.6.

Cost item	Percentage	Item cost	Cumulative cost
Total direct costs including site specifics		360,433.3	360,433.3
Contractor's on-costs	32.99%	118,907.0	479,340.3
Delivery partner on-costs	40.03%	191,879.9	671,220.2
SW corporate on-costs	4.35%	29,198.1	700,418.3
Tender to out-turn adjustment	3.51%	24,584.7	725,002.9

#### ***A8.9.6 Corporate overheads***

The corporate on-costs are described above.

#### ***A8.9.7 Confidence grade – Reporter assessment***

Our assessment of the confidence grade is set out below:

Criteria	Company	Reporter Commentary	Reporter
Scope	4	Scottish Water has experience of similar work. However, SW was not able to use estimates of similar work to confirm the scope of works and rates applied.	3
Cost	4	SW costed the works using rates from the ADP tenders and current framework contracts.	3
Risk	3	A tender to outturn rate has been applied. This figure is specific to water non-infrastructure work.	3
Compliance	4	SW has prepared a detailed scope of works for the estimate. SW has excluded the local control panels for each filter cell.	4

### **A8.10 Item 4.9 - Replacement of disinfection plant, output 12MI/d**

#### ***A8.10.1 Key Points***

1. The direct costs for the estimate have been taken from a quotation from a framework supplier obtained specifically for the purpose of completing the Cost Base.
2. The denominator used is 12 Mld as set out in the Cost Base specification.

#### ***A8.10.2 General information***

SW provided a copy of the Cost Base specification to a framework supplier for similar plant who was asked to price the works. The quotation received covers the scope of work set out in the Cost Base specification. The detailed interpretation of the scope of works was determined by the framework supplier.

#### ***A8.10.3 Direct costs***

The direct costs for the estimate have been taken from a quotation from a framework supplier obtained specifically for the purpose of completing the Cost Base.

We challenged SW to demonstrate that the quotation obtained for the Cost Base was consistent with prices obtained for similar work in its normal course of business. In response SW provided a copy of the relevant framework agreement, and a summary document which detailed the source of each quoted figure in relation to the framework agreement.

SW has deflated the current estimates obtained to price the works to mid 2007-08 prices using RPI.

#### ***A8.10.4 Adjustments and exclusions***

SW has applied an adjustment factor to take the estimate from COPI = 161 to COPI = 162.5. However, since the base costs have already been deflated to mid 2007-08 prices based on RPI, we do not believe that this COPI adjustment is necessary.

SW has made no further adjustments or allowances for site specific costs. The direct costs of the plant includes local cabling, local control panel and interconnecting pipework and dosing lines.

#### ***A8.10.5 Indirect costs***

The in-direct costs applied to this estimate (including corporate overheads) are described in Section A4.3.3. We understand that the percentages are applied as follows. The distribution of these costs between the categories set out in the CBS is described in Section A4.3.6.

<b>Cost item</b>	<b>Percentage</b>	<b>Item cost</b>	<b>Cumulative cost</b>
Total direct costs including site specifics		42,177.6	42,177.6
Contractor's on-costs	34.75%	14,656.7	56,834.3
Delivery partner on-costs	41.47%	23,569.2	80,403.5
SW corporate on-costs	3.73%	2,999.1	83,402.5
Tender to out-turn adjustment	1.65%	1,376.1	84,778.7

#### ***A8.10.6 Corporate overheads***

The corporate on-costs are described with the indirect costs above.

#### ***A8.10.7 Confidence grade – Reporter assessment***

Our assessment of the confidence grade is set out below:

<b>Criteria</b>	<b>Company</b>	<b>Reporter Commentary</b>	<b>Reporter</b>
Scope	4	Scottish Water has experience of similar work but has not been able to draw on this work to prepare the cost base.	3
Cost	3	Costs are based on a quotation obtained for the purpose of the Cost Base.	3
Risk	3	A tender to outturn rate has been applied. This figure is specific to water non-infrastructure work..	3
Compliance	4	The estimate is based on a specific quotation based on the Cost Base specification.	4

## **A8.11 Item 4.10 - New service reservoir, capacity 4MI**

### ***A8.11.1 Key Points***

1. The service reservoir costs have been built bottom up from Q&S3A Associate Delivery Partner (ADP) tender rates.
2. Comparison with the Investment Plan cost functions indicates that the bottom up estimate is representative of Scottish Water's actual costs.

### ***A8.11.2 General information***

Scottish Water advised they have not constructed any new service reservoirs recently. Therefore they have produced this standard cost estimate by carrying out an outline design of a service reservoir to satisfy the Cost Base specification. This outline design has then been costed using ADP tender rates to produce a bottom up standard cost as described in Section A4.4.

Scottish Water prepared a detailed dimensioned sketch of a service reservoir. The standard cost estimate is based on a rectangular reinforced concrete structure retaining walls and roof supported on columns.

It is assumed that the ground has reasonable bearing capacity and the reservoir will not require a major structural base slab. It is assumed that ground water will not be present and drainage around the reservoir is not required to control both external water pressure and risk of leakage into the reservoir.

During our audit we reviewed the outline design for the 4MI reservoir and concluded that it was a reasonable interpretation of the Cost Base requirements.

We challenged Scottish Water regarding provision of access ladders, intermediate platforms and the materials these would be made of. The cost estimate has been altered to include stainless steel ladders with hoops as fall protection.

The Scottish Water design is a conventional service reservoir of insitu construction and regular movement joints to ensure minimal concrete and reinforcement requirements. Scottish Water provided drawings of one of their most recent designs which compares well with the Cost Base solution.

We checked and confirmed that the proposed structure has 4 MI capacity at 4 metre depth and approximately 150 mm freeboard to underside of the roof. We reviewed the calculation of quantities and the transfer of quantities to the estimate. The structural design is very efficient and we challenged Scottish Water whether the minimal section sizes would be used in practice. We have been provided with a Scottish Water designed reservoir of 1996 as an example of SW practice which had similar spans and depths but had much thicker walls and marginally thicker roof.

During our audit we reviewed the backup spreadsheets used to derive the standard cost in both hard copy and on-screen and followed costs back to the framework rates supplied by the ADP contractor.

**A8.11.3 Direct costs**

The estimate has been costed using the ADP tender rates described in Section A4.4 above. Cost functions have not been used for this standard cost.

We reviewed the rates used on the cost estimate and noted the following:

- The particular ADP tender used to cost the service reservoir had not provided a rate for the roof construction and Scottish Water had used the wall construction cost. Scottish Water has revised the roof cost to the ADP rate for a contact tank roof which is comparable to a service reservoir roof.
- Pipework and fittings were costed using ADP tender rates. The material and fittings costs have been revised to the Scottish Water framework rates to reflect true costs.
- The sum allowed for testing in the selected ADP tender appeared low and was revised for 2<sup>nd</sup> draft.

We challenged Scottish Water as to why the particular framework contractor was used. Scottish Water had carried out a study of their frameworks and chose this particular contractor to be used for water resources Cost Base estimates. This is described in Section A4.4 above.

The direct costs relate to the ADP tender rates which are at March 2005 prices. The inflation adjustment to mid 2007-08 prices is included as a direct cost adjustment. The 2<sup>nd</sup> draft inflation adjustment to COPI 162.5 is applied in the adjustments section separately.

The direct costs equate to approximately 81% of the direct cost calculated from the 2<sup>nd</sup> draft Investment Plan cost function used for water storage at treatment works.

Framework quotes have been obtained for the kiosk, telemetry panel and the roof membrane which appear reasonable.

**A8.11.4 Adjustments and exclusions**

The standard cost estimate is based on a detailed scope of work prepared in line with the standard cost estimate. It has not been necessary to include any further adjustments or exclusions in terms of scope.

The ADP tender rates used to price the standard cost were tendered in March 2005. The adjustment to inflate the estimate to mid 2007-08 prices has been included as a direct cost adjustment. There is an adjustment item applied to inflate costs to COPI 162.5.

**A8.11.5 Indirect costs**

The in-direct costs applied to this estimate (including corporate overheads) are described in Section A4.3.3. We understand that the percentages are applied as follows. The distribution of these costs between the categories set out in the CBS is described in Section A4.3.6.

Cost item	Percentage	Item cost	Cumulative cost
Total direct costs		442285.80	442285.80

Cost item	Percentage	Item cost	Cumulative cost
Site specific on costs	0.00%	0	442285.80
Contractor's on-costs	32.99%	145910.10	588195.90
Delivery partner on-costs	40.03%	235454.80	823650.70
SW corporate on-costs	4.35%	35828.81	859479.50
Tender to out-turn adjustment	3.51%	30167.73	889647.20

Site specific allowances for site telemetry, site cabling and intersite pipework are included in the direct costs.

#### ***A8.11.6 Corporate overheads***

The corporate on-costs are described with the indirect costs above.

#### ***A8.11.7 Confidence grade – Reporter assessment***

Our assessment of the confidence grade is set out below:

Criteria	Company	Reporter Commentary	Reporter
Scope	3	Scottish Water does not have recent experience of similar work.	3
Cost	4	Costs are based on target cost estimates based on tendered ADP rates. The bottom up estimate appears to be consistent with Scottish Water's historic costs.	4
Risk	3	A tender to outturn rate has been applied. This figure is specific to water non-infrastructure work.	3
Compliance	4	The estimate is based on a detailed bottom up scope of works supported by drawings and detailed bills of quantities.	4

### **A8.12 Item 4.11 - Refurbishment of service reservoir, capacity 1Ml**

#### ***A8.12.1 Key Points***

1. SW has prepared a detailed scope of works for refurbishing a service reservoir to reflect the quantities of works set out in the standard cost specification.
2. The standard cost estimate has been costed using Q&S3A Associate Delivery Partner (ADP) tender rates. The framework rates are representative of the current cost base for this work.
3. Some adjustments and exclusions were challenged and adjusted for the 2<sup>nd</sup> draft Business Plan.

### ***A8.12.2 General information***

An outline design for a service reservoir refurbishment along with quantities of the areas and volumes required for the Cost Base refurbishment items was provided. These quantities were costed against the ADP tender rates to produce a bottom up standard cost.

During the audit we reviewed the backup spreadsheets used to derive the standard cost in both hard copy and on-screen and followed costs back to the framework rates supplied by the ADP contractor. The outline design for the 1MI reservoir and the methods of refurbishment were reviewed and found to comply with the Cost Base requirements.

We noted the following in respect of the scope of works included in the standard cost estimate:

- The replacement access system is by ladders only. Safety hoops were added for 2<sup>nd</sup> draft Business Plan and the material altered to stainless steel rather in line with company practice.
- 4 covers have now been provided in line with SW's standard requirements.

### ***A8.12.3 Direct costs***

The estimate has been costed using the ADP tender rates described in Section A4.4 above.

We reviewed the rates used on the cost estimate and noted the following:

- The relining painting system cost appeared particularly low at 1<sup>st</sup> draft stage. SW have obtained quotes for the lining system which now appear reasonable.
- The sum allowed for testing in the selected ADP tender appeared low at 1<sup>st</sup> draft stage. Scottish Water note that SW's costs of testing and commissioning are included in the on-cost percentages. It was also noted that company practice does not include hydraulic testing of refurbishment works to service reservoirs.

The direct costs relate to the ADP tender rates which are at March 2005 prices. The inflation adjustment to mid 2007-08 prices is included as an adjustment.

### ***A8.12.4 Adjustments and exclusions***

The standard cost estimate is based on a detailed scope of work prepared in line with the standard cost estimate. It has not been necessary to include any further adjustments or exclusions in terms of scope.

The ADP tender rates used to price the standard cost were tendered in March 2005. The adjustment to inflate the estimate to mid 2007-08 prices has been included as a direct cost adjustment. A further adjustment is included in this section to inflate costs from 161 to 162.5.

### ***A8.12.5 Indirect costs***

The in-direct costs applied to this estimate (including corporate overheads) are described in Section A3.3.3.

It is not possible to relate the value of on-costs in the CBS with the stated percentages. This is because the order in which the percentages are applied is different from the order they appear in the CBS. We understand that the percentages are applied as follows:

Cost item	Percentage	Item cost	Cumulative cost
Total direct costs		48551.44	48551.44
Site specific on costs	0.00%	0.00	48551.44
Contractor's on-costs	34.75%	16871.63	65423.07
Delivery partner on-costs	41.47%	27130.95	92554.01
SW corporate on-costs	3.73%	3452.26	96006.28
Tender to out-turn adjustment	1.65%	1584.10	97590.38

The standard cost specification does not require site telemetry, site cabling and intersite pipework. As a result it has not been necessary to include the specific on-costs to cover these items.

The on-costs are not specific to the ADP tender used to estimate the direct costs.

#### ***A8.12.6 Corporate overheads***

The corporate on-costs are described with the indirect costs above.

#### ***A8.12.7 Confidence grade – Reporter assessment***

Our assessment of the confidence grade is set out below:

Criteria	Company	Reporter Commentary	Reporter
Scope	4	Scottish Water does not have recent experience of similar work.	3
Cost	4	Costs are based on target cost estimates based on tendered ADP rates. The bottom up estimate appears to be consistent with Scottish Water's historic costs.	4
Risk	3	A tender to outturn rate has been applied. This figure is specific to water non-infrastructure work.	3
Compliance	4	The estimate is based on a detailed bottom up scope of works supported by drawings and detailed bills of quantities.	4

#### **A8.13 Item 4.12 - Replacement of variable speed pumps, output 6 to 9MI/d**

SW has not submitted a standard cost estimate for the replacement of variable speed pumps, output 6 to 9MI/d.

SW notes that it does not undertake this type of work. It comments that the shaft driven pumps specified by the Cost Base question are not used by Scottish Water, due to reliability and operating cost issues and are excluded from its Standards and Specifications.

We believe that SW's statement is reasonable but currently have no data on whether any such work could be undertaken as part of SW's capital maintenance programme.

#### **A8.14 Item 4.13 - New fixed-speed pumpset, output 10Ml/d**

##### ***A8.14.1 Key Points***

1. For the Final Cost Base, SW has removed the costs of the PLC included in the previous submission, in line with the Cost Base specification.
2. SW has developed the estimate as a bottom up estimate. Rates and prices for major plant supply have been taken from direct quotations from framework suppliers. Cost of installation and commissioning have been built up from productivity estimates with unit costs taken from framework or supplier contracts for Q&S3A inflated by COPI. Costs of the capital maintenance investment programme have generally been built up using cost curves and so it has not been possible for Scottish Water to demonstrate fully the consistency of the standard cost with that of the Investment Plan. However, we do acknowledge that budget prices have been obtained from direct quotations for framework suppliers using framework rates.
3. SW has priced on the basis that the installation forms part of a planned maintenance contract. For the first Cost Base report no allowance was made for design for pump replacement on an existing installation. However, an "average level" for design is now included in the overhead percentage, which may be higher than some other companies are assuming (see also A8.14.5 below).
4. An overall figure for all overheads of 101% of the base construction costs has been used for this standard cost. This is based on an average on-cost for all types of non-infrastructure work in the price band of the work and as such is not necessarily completely reflective of the actual on-costs for capital maintenance programmes of this type. This has been discussed in section A3.3.3.
5. We believe that the inclusion of different categories of on-costs by different water companies can lead to significant uncertainty in any comparison between companies. We believe that regulators should carefully expose all estimates of on-costs used by all companies to ensure fairness in comparisons.
6. The denominator used is 10 Mld as set out in the Cost Base specification.

##### ***A8.14.2 General information***

SW has developed the standard cost estimate as a bottom up estimate based on a detailed assessment of the standard cost specification.

A specific quotation has been obtained for a new fixed speed pump to meet the standard cost specification.

Detailed schedules of work were prepared for the erection and commissioning plus additional pipework, valves and plinths required by the standard cost specification.

The specification for the electrical works was prepared by an electrical engineer working for Scottish Water's Cost Consultant.

The direct costs have been marginally changed from the first Cost Base submission in two respects:

- A reduction in the assumed time needed to install the new RTU; and
- An increase in labour costs due to an error in the inflation indices originally applied.

We accept the changes, which are hardly material. We believe that SW has complied with the standard cost specification.

#### ***A8.14.3 Direct costs***

SW obtained two quotations from its pump framework suppliers. They were very similar. We confirmed that delivery was included in the quotations as was documentation to Scottish Water's specification.

The associated RTU telemetry cost was taken from a quotation from a framework suppliers.

The estimate for the ICA in the previous standard cost estimate included the provision of a PLC. The Cost Base specification notes that the existing PLC can be reprogrammed and this element of work has been excluded from the revised submission. The revised standard cost estimate includes for the provision of instrumentation and cabling, connection to the PLC and reprogramming of the PLC. SW has assumed that all other equipment can be retained and any new equipment housed within the existing panels and cabinets.

Additional pipework was limited to a single spool piece between the suction side isolating valve and the pump plus a spool piece and isolating valve on the discharge side.

Cabling is limited in extent, with a direct cost of £250 for material.

Installation costs were calculated from productivities assumed by the estimator multiplied by unit rates from the Scottish Water Solutions tender of Q1 2005 inflated by COPI. The installation costs total £1927 or 7.9% of the supply costs. Scottish Water was not able to verify that these costs were consistent with those from completed projects. We believe that this part of the standard cost is subject to the greatest uncertainty.

#### ***A8.14.4 Adjustments and exclusions***

SW has developed the standard cost as a bottom up estimate. No further adjustments or exclusions have been necessary to comply with the standard cost specification.

#### ***A8.14.5 Indirect costs***

The in-direct costs applied to this estimate (including corporate overheads) are described in Section A4.3.3. We understand that the percentages are applied as follows. The distribution of these costs between the categories set out in the CBS is described in Section A4.3.6.

Cost item	Percentage	Item cost	Cumulative cost
Total direct costs including site specifics		23,413	23,413
Contractor's on-costs	34.75%	8,136	31,548
Delivery partner on-costs	41.47%	13,083	44,632
SW corporate on-costs	3.73%	1,665	46,296
Tender to out-turn adjustment	1.65%	764	47,060

The percentage on-costs are based on the general mix of work carried out by Scottish Water and are not specifically related to capital maintenance work. A similar approach has been adopted for the Investment Plan. The split in Item 3a in particular may not be reflective of capital maintenance projects where the % of design costs may well be lower.

#### ***A8.14.6 Confidence grade – Reporter assessment***

Our assessment of the confidence grades are set out below:

Criteria	Company	Reporter Commentary	Reporter
Scope	4	We understand that SW has not carried out pump replacements in this size band in the recent past but has undoubtedly done so in prior periods. However, for this standard cost, costs have been built from the bottom up with little reference to actual past costs.	4
Cost	4	Costs have been built up from framework budget prices with individual estimating of installation costs. Overhead costs are now consistent with average tendered overhead costs for non-infrastructure expenditure. These average on-costs are not necessarily fully consistent with capital maintenance programmes, which may be marginally lower. The confidence grade represents our interpretation of the WIC guidance and does not reflect an assessment of the accuracy of the answer.	4
Risk	3	A tender to outturn rate has been applied. This figure is specific to water non-infrastructure work.	3
Compliance	4	The estimate is based on a bottom up build up at a sub-process level which should allow compliance with the definition.	4

### **A8.15 Item 4.14 - Replacement motor control centre for an existing variable speed pumping station, 90kW total installed motor capacity**

#### ***A8.15.1 Key Points***

1. SW has developed this estimate in exactly the same manner as for Item 4.13.
2. SW has developed the estimate as a bottom up estimate. Rates and prices for major plant supply have been taken from direct quotations. Costs of installation and commissioning have been built up from productivity estimates with unit costs taken from framework or supplier contracts. The cost has significantly increased due to the higher level of overheads assigned.

3. Scottish Water have removed the cost of a standby generator that was included for the first draft business plan on the basis that the use of temporary drives will allow the MCC to be removed while keeping the pumps in operation.
4. SW has priced on the basis that the installation forms part of a planned maintenance contract. For the first Cost Base report no allowance was made for design for MCC replacement on an existing installation. However, an “average level” for design is now included in the overhead percentage, which may be higher than some other companies are assuming (see also (5) below).
5. An overall figure for all overheads of 101% of the base construction costs has been used for this standard cost. This is based on an average on-cost for all types of non-infrastructure work in the price band of the work and as such is not necessarily completely reflective of the actual on-costs for capital maintenance programmes of this type. This has been discussed in section A4.5.3. .
6. Errors that we reported were in the first draft business plan have now been corrected.
7. We believe that the inclusion of different categories of on-costs by different water companies can lead to significant uncertainty in any comparison between companies. We believe that regulators should carefully expose all estimates of on-costs used by all companies to ensure fairness in comparisons.
8. The denominator used is 90 kW as set out in the Cost Base specification.

#### ***A8.15.2 General information***

SW has developed the standard cost estimate as a bottom up estimate based on a detailed assessment of the standard cost specification.

Specific quotations have been obtained for the MCC and other major plant items to meet the standard cost specification.

Detailed schedules of work were prepared for the erection and commissioning.

The specifications for erection and commissioning of the electrical works were prepared by an electrical engineer working for Scottish Water’s Cost Consultant.

The direct costs have been changed from the first Cost Base submission in three respects:

- Removal of a standby generator;
- A reduction in commissioning time.
- An increase in labour costs due to an error in the inflation indices originally applied.

We accept the changes, the only one of any significance being the removal of the standby generator. We believe that other changes are hardly material.

We believe that SW has complied with the standard cost specification.

**A8.15.3 Direct costs**

SW obtained one quotation from its electrical panel framework supplier (as used for Line 13).

Cost no longer include for a temporary generating set to maintain flows as the new MCC was connected as temporary starters have been provided.

The cost of the temporary starters is based on 2 separate starters and not a temporary control panel

Installation labour costs were calculated from productivities assumed by the estimator multiplied by unit rates from the Scottish Water Solutions tender of Q1 2005 inflated by COPI. An error in the previous submission has been rectified for this submission. The installation costs including the provision of temporary equipment totals £9250 or 28.5% of the supply costs. This is different to Table 8 Line 7 which is largely explained by the need for variable speed temporary drives.

Scottish Water was not able to verify that these costs were consistent with those from completed projects. We believe that this part of the standard cost is subject to the greatest uncertainty.

**A8.15.4 Adjustments and exclusions**

SW has developed the standard cost as a bottom up estimate. No further adjustments or exclusions have been necessary to comply with the standard cost specification

**A8.15.5 Indirect costs and corporate overheads**

The in-direct costs applied to this estimate (including corporate overheads) are described in Section A4.3.3. We understand that the percentages are applied as follows. The distribution of these costs between the categories set out in the CBS is described in Section A4.3.6.

Cost item	Percentage	Item cost	Cumulative cost
Total direct costs including site specifics		42,028.1	42,028.1
Contractor's on-costs	34.75%	14,604.8	56,632.9
Delivery partner on-costs	41.47%	23,485.6	80,118.5
SW corporate on-costs	3.73%	2,988.4	83,106.9
Tender to out-turn adjustment	1.65%	1,371.3	84,478.2

Indirect costs and corporate overheads have been applied as per the pumpset in Line 13 above and our comments made in that section apply.

**A8.15.6 Confidence grade – Reporter assessment**

Our assessment of the confidence grades are set out below:

Criteria	Company	Reporter Commentary	Reporter
Scope	4	We are unaware whether SW has carried out MCC replacements in this size band in the recent past but has undoubtedly done so in prior	4

		periods. However, for this standard cost, costs have been built from the bottom up with little reference to actual past costs.	
Cost	4	Costs have been built up from framework budget prices with individual estimating of installation costs. Overhead costs are now consistent with average tendered overhead costs for non-infrastructure expenditure. These average on-costs are not necessarily fully consistent with capital maintenance programmes, which may be marginally lower. The confidence grade represents our interpretation of the WIC guidance and does not reflect an assessment of the accuracy of the answer.	4
Risk	3	A tender to outturn rate has been applied. This figure is specific to water non-infrastructure work.	3
Compliance	4	The estimate is based on a bottom up build up at a sub-process level which should allow compliance with the definition.	4

## **A9 WASTEWATER INFRASTRUCTURE STANDARD COSTS (TABLE 6)**

### **A9.1 Overview**

Scottish Water has completed all standard cost estimates for sewer laying and sewer rehabilitation.

### **A9.2 Block A - Sewer laying**

#### ***A9.2.1 Key Points***

1. The estimate has been costed using the Engineering Estimating System cost functions described in Section A3.3 above.
2. The framework rates are representative of the current cost base for the majority of this work.
3. We have identified a number of issues which might affect the comparability of standard costs for sewer laying relating to the provision of concrete surrounds to manholes and trench backfill. We recommend that WICS considers these issues against the assumptions made in other standard cost estimates used in the efficiency comparison.

#### ***A9.2.2 General information***

SW has based the standard cost estimate on EES cost functions which aim to capture the Cost Base specification and exclusions for sewer laying from Q&S3A Capex 3 project estimates.

During the audit we reviewed the cost functions used to derive the standard cost in both hard copy and on-screen and followed several data points (Capex 3 cost estimates) back to the Investment Plan estimate and framework rates supplied by the ADP contractor.

The estimates are based on tendered rates for pipes with 2m cover to soffit and it has not been necessary to make any adjustments to comply with the depth specification of the standard cost. Where data points included costs for extra depth this was excluded from the Cost Base function.

From our examination of a sample of data points we found the exclusions of the Cost Base specification such as ground conditions, over-pumping, un-charted services and contamination of excavated materials were compliant.

Costs associated with health and safety and environmental regulations are included in the contractor's overheads and not a direct cost which is reasonable.

It is assumed that non-complex trench dewatering is included in the general excavation rates and no specific allowance has been made for trench dewatering.

It is assumed that the tendered rates allow for the disposal to landfill 1 km away. No adjustment has been made for distance to landfill.

The specification requires trenches in highways to be refilled with granular material. Scottish Water assumes that the excavated material will be granular and can be used to refill trenches in highway. In its project estimates for sewers in highway Scottish Water assumes that imported granular material will be required to backfill trenches. Scottish Water has noted that this is not the case for every project data point. For the Cost Base Scottish Water includes costs for placing granular backfill but not importing the backfill or exporting non compliant backfill. We recommend that WICS considers this assumption with assumptions made in other standard cost estimates used in the efficiency comparison.

Scottish Water has based the standard cost estimate on a 500 m length of sewer. The data set used to create the sewer cost function includes sewers of lengths between 160m and 1100m. The tender rates used to cost the work are not length dependent. We understand that rates would not be varied for length of sewer installed with contractors expected to accept the balance of risk over a portfolio of work. However, we note that it would be possible to base the standard cost estimates on longer lengths taking account of lower unit costs of production based on higher productivity rates. We recommend that WICS considers this assumption with assumptions made in other standard cost estimates used in the efficiency comparison.

The rates produced by the cost function have been adjusted to allow for the CBS specified number of fittings. All junctions and end caps are removed where they were found within Capex 3 estimates and added back at the Cost Base frequency. The Cost Base specification calls for junctions every 10 metres which has been interpreted as 4 per 50 m length. We suggest that WICS clarifies this requirement.

Scottish Water has allowed for ten manholes over a 500 m length of sewer. This is in accordance with the revised WICS specification of the length of sewer divided by 50.

Two cost functions are used to create the sewer costs; the sewer laying cost function and the manhole cost function. We examined a sample of the Project Estimating Forms (PEF) used to combine the 500m of sewer and 10 manholes and they appeared reasonable.

The pipe materials are of vitrified clay, concrete and MDPE. We understand the original ADP tender rates used are based on 150 & 225mm – clay pipes and 300 & 450mm – concrete pipes. We audited a number estimates and found the estimators had replaced the original rate for pipe material with either clay, concrete or MDPE which is reasonable for the specific project and it is good that the chosen pipe material costs are followed through into the Cost Base. We asked Scottish Water to confirm what specific pipe material the estimator intended where MDPE is stated. This is normally a pressure pipe and not a gravity sewer pipe material. We had previously challenged Scottish Water as to why rising mains were included with sewers as these did skew the cost curve; the rising mains were removed for the final cost curves audited.

The Cost Base cost function for manholes was adjusted to exclude manholes of 1500mm diameter in line with Sewers for Adoption 6<sup>th</sup> Edition which does not require manholes in excess of 1200mm diameter.

The cost estimates allow for reinstatement at rates included in the ADP tenders. This allows for permanent reinstatement on backfill of the trench without the need for temporary reinstatement. Scottish Water has confirmed that this is its policy and practice.

**A9.2.3 Direct costs**

The standard cost estimate has been priced using two cost functions, sewers and manholes, developed from Capex 3 Target Costs as described in Section A4.3.2 above.

The Cost Base cost functions were developed from all available and appropriate Capex 3 estimates. It includes estimates of projects from various regions and from the various ADP contractors. It is therefore representative of the balance of work across Scotland.

**A9.2.4 Adjustments and exclusions**

The value of the non-Cost Base processes included in the Investment Plan cost functions but excluded from the Cost Base function has been broken down into the various categories stated by WICS on the Cost Base Structure sheets. Scottish Water explained how they anticipated calculating these values at our audit but the values have not been examined by the Reporter.

Scottish Water intended to identify a Capex 3 estimate at each of the four CBS sizes, calculate the category value split of this data point and use these proportions to distribute the Cost Base function derived value on the CBS sheets. We have not confirmed if this is the method finally adopted. Using this method will not give a particularly accurate value to these categories if they are to be used for comparison purposes.

**A9.2.5 Indirect costs**

The indirect costs described in Section A4.3.3 above have been applied.

**A9.2.6 Corporate overheads**

The corporate overheads described in Section A4.3.3 above have been applied.

**A9.2.7 Confidence grade – Reporter assessment**

Our assessment of the confidence grades are set out below. SW has applied the same grades to the three pipe laying areas and our comments apply to the three areas:

Criteria	Company	Reporter Commentary	Reporter
Scope	5	Scottish Water has broad experience of similar work.	5
Cost	4	The costs are based on tendered rates which are applied to prepare target costs for current estimates.	4
Risk	3	A tender to outturn rate has been applied.	3
Compliance	4	We have noted issues above regarding compliance with the cost base specification in respect of manhole frequency, manhole surrounds and backfill in highways.	3

### A9.3 Block B - Sewer rehabilitation

#### A9.3.1 Key Points

1. The estimate has been costed using the Engineering Estimating System cost functions described in Section A3.3 above.
2. The tendered ADP rates have been adjusted to Cost Base rates using a percentage reduction derived from water mains relining.

#### A9.3.2 General information

An Investment Plan cost curve has been created for sewer rehabilitation as described in Section A4.3.2. The curve is entirely Q&S2 data and all based on the GRP cast in place liner technique.

The Cost Base rate is derived as 62% of the Investment Plan rate direct costs. This percentage is taken directly from the Cost Base / non Cost Base split of the water mains rehabilitation by re-lining cost curve. The percentage has not been developed for sewerage rehabilitation and may not be representative of this type of work.

#### A9.3.3 Indirect costs

The indirect costs described in Section A4.3.3 above have been applied.

#### A9.3.4 Corporate overheads

The corporate overheads described in Section A4.3.3 above have been applied.

#### A9.3.5 Confidence grade – Reporter assessment

Our assessment of the confidence grades are set out below. SW has applied the same grades to the three pipe laying areas and our comments apply to the three areas:

Criteria	Company	Reporter Commentary	Reporter
Scope	5	Scottish Water does not have recent experience of this work.	3
Cost	4	The cost split between non-Cost Base and Cost Base is based on a water rehabilitation rate and not wastewater.	2
Risk	3	A tender to outturn rate has been applied.	3
Compliance	4	We have not audited the data points relating to the cost function for this item because they were not available at the time of audit.	3

## **A10 WASTEWATER NON-INFRASTRUCTURE STANDARD COSTS (TABLE 8)**

### **A10.1 Overview**

SW has completed the wastewater non-infrastructure standard costs with the following exceptions:

- Line 8: First time rural sewage treatment p.e.200
- Line 9: Installation of denitrification at existing secondary treatment works p.e.40,000
- Line 14: Extension to existing conventional sludge treatment facility, additional throughput 3 ttds per annum.

In the following sections we provide comment on the standard cost estimates completed by SW and comment on SW's reasons for not completing the standard cost estimates noted above.

### **A10.2 Item 8.1 - Storage tank to combined sewer overflow, capacity 750m<sup>3</sup>**

#### ***A10.2.1 Key Points***

1. For the Final Cost Base, SW has:
  - a. Reduced the depth from ground surface to top water level in the shaft.
  - b. Amended the excavation volumes to allow for construction in an unsupported open excavation.
  - c. Applied the UID on-cost percentages.
2. The estimate has been costed using Q&S3A Associate Delivery Partner (ADP) tender rates described in Section A4.4 above supported by other current quotations and historic estimates.
3. SW has prepared a detailed scope of works based on a circular segmental shaft. SW has assumed ideal ground conditions which has minimised the thickness of the base slab and temporary works.
4. The denominator used is one unit as set out in the Cost Base specification.
5. We challenged the calculation of overbreak volume and the rates applied. SW has reviewed its estimate and we understand that the standard cost adjusted for these issues would be £412,730.23.

#### ***A10.2.2 General information***

SW has based the scope of the standard cost on a circular storage shaft constructed from precast concrete segmental rings. The standard cost design follows a draft design standard which sets out accepted Scottish Water practice and typical details of construction which are a

starting point for the development of detail designs. SW has provided example drawings of the use of segmental shaft storage tanks.

The overall scope of works includes the following:

- Connection to the overflow from an existing CSO.
- 10 m of 500 mm pipe 2m deep to invert to divert the overflow to a new storage tank. SW has assumed that this pipe connects directly to the existing CSO and to the new storage tank.
- A shaft constructed from circular pre-cast concrete segmental rings. It is assumed that the ground level is the same at the CSO and the storage shaft. The storage volume is 750 m<sup>3</sup> from a top water level which is 1.15 m below ground. The assumed top water level will surcharge the incoming pipe. In practice, the level of surcharge which can be accepted will be determined by impact of surcharge on the performance of the adjacent sewerage system. SW provided recent examples of where the top water level in storage tanks were higher than the soffit of the incoming pipe.
- An in-situ reinforced concrete base slab. SW has interpreted the general provisions of the Cost Base specification to assume that a level rock horizon is available at exactly the correct formation level to precise shape required for the base design. In addition, SW has assumed that there will be no uplift pressure on the base due to ground water over the life of the structure. On the basis of these assumptions SW has assumed a nominal base slab 100 mm thick which is thickened to 400 mm locally under the shaft walls and columns included to support the roof slab. In discussion, SW agrees that these ideal conditions are not found in practice and shafts constructed by SW have thicker base slabs to cater for bearing and uplift forces. We recommend that WICS considers this assumption with assumptions made in other standard cost estimates used in the efficiency comparison.
- SW has assumed that the roof slab will not be subject to vehicle loading. It has allowed for the provision of an embankment around the shaft to ensure that vehicles will not be able to access the roof. The Cost Base specification notes that only secure access covers are to be provided at ground level. SW's standard practice documents calls for design for point loadings in excess of those allowed in the slab design. We recommend that WICS considers this assumption with assumptions made in other standard cost estimates used in the efficiency comparison.
- Provision is made for a tank cleaning using a single pumped jet mixer. The design is a common arrangement used by SW for storm tanks.
- SW has allowed for a sloping benching draining to a sump. The slope of the benching is consistent with that used by SW when designing storm tanks with similar cleaning systems to that described above. The benching has an average thickness of 150 mm.
- SW has made provision for two drain down pumps – duty and standby. Pipework and couplings are provided to allow the tank to be drained down by tankers in the event of pump failure.

- The estimate allows for individual pipes from the drain-down pumps to a new manhole constructed on the existing sewer. No allowance is made for isolating and non-return valves on the pipelines. Scottish Water has noted that its recent practice is to use separate return pipes to remove the need for valves.
- Reasonable provision is made for access covers both to access the shaft and allow for the removal of the pumps.

Circular shafts are generally constructed as either a cassion or by underpinning. Both techniques require a temporary concrete collar to support the shaft during construction. SW has assumed that the shaft can be constructed in open excavation. SW has allowed for 2 m working room in the excavation around the shaft base and has assumed side slopes of 60 degrees from the horizontal unsupported over 6 m deep. These assumptions are based on SW's interpretation of ideal ground conditions. We have not experienced similar conditions except in soft rock excavation.

We challenged SW on the calculation of overbreak volume based on the assumptions set out above and the rates applied. SW has reviewed its estimate and we understand that the standard cost adjusted for these issues would be £412,730.23.

### ***A10.2.3 Direct costs***

The standard cost estimate has been priced using a mix of ADP tender rates as described in Section A4.4 above supported by other specific prices and quotations.

The segmental shaft rates are based on a specific supplier quotation.

The estimate of plant and labour required to install the segmental shaft lining is based on a bottom up estimate of plant and labour. The assessment appears to be reasonable.

Rates for pipes and fittings appear to be consistent with ADP tender rates.

A specific quotation has been obtained for the pumps and mixers.

The costs of the MCC, cabling and telemetry equipment associated with the pumps has been taken from a specific supplier's quotation. SW has provided a quotation for similar work delivered under Q&S3 to demonstrate that the quote was reasonable.

The ADP tender rates used to price the standard cost were tendered in March 2005. The adjustment to inflate the estimate to mid 2007-08 prices has been included as a direct cost item.

### ***A10.2.4 Adjustments and exclusions***

The standard cost estimate is based on a detailed scope of work prepared in line with the standard cost estimate. It has not been necessary to include any further adjustments or exclusions in terms of scope.

### ***A10.2.5 Indirect costs***

The in-direct costs applied to this estimate (including corporate overheads) are described in Section A4.3.3. We understand that the percentages are applied as follows. The distribution

of these costs between the categories set out in the CBS is described in Section A4.3.6. SW has applied the on-cost percentages relating to UID projects in the Investment Plan.

Cost item	Percentage	Item cost	Cumulative cost
Total direct costs including site specifics		189,711	189,711
Contractor's on-costs	44.12%	83,701	273,412
Delivery partner on-costs	41.51%	113,493	386,905
SW corporate on-costs	4.29%	16,598	403,503
Tender to out-turn adjustment	1.02%	4,116	407,619

#### ***A10.2.6 Corporate overheads***

The corporate on-costs are described with the indirect costs above.

#### ***A10.2.7 Confidence grade – Reporter assessment***

Our assessment of the confidence grade is set out below:

Criteria	Company	Reporter Commentary	Reporter
Scope	3	SW has limited recent experience of this type and scale of work. SW is developing proposals for this type and scale of work in Q&S3A.	3
Cost	4	SW has prepared the estimate mainly from current tender data supported by current quotations.	3
Risk	3	A tender to outturn rate has been applied. This figure is specific to UID schemes.	3
Compliance	4	SW has based its estimate on a detailed scope of works developed for the standard cost.	4

### **A10.3 Item 8.2 - Large storage tank to a combined sewer overflow, capacity 3,000m<sup>3</sup>**

#### ***A10.3.1 Key Points***

1. For the Final Cost Base, SW has:
  - a. Reduced the depth from ground surface to top water level in the shaft.
  - b. Amended the excavation volumes to allow for construction in an unsupported open excavation.
  - c. Applied the UID on-cost percentages.
2. SW has followed the same approach to developing the scope and standard cost estimate as used for Item 8.1 described above. The quantities have been amended and additional items of scope added for the larger tank. Our comments on this estimate are the same as those set out for Item 8.1 above and have not been repeated below.

3. The direct costs for the estimate has been costed using ADP tender rates described in Section A3.3 above supported by other current quotations.
4. SW has prepared a detailed scope of works based on a circular segmental shaft. SW has assumed ideal conditions which has minimised the thickness of the base slab and temporary works necessary to construct the shaft.
5. We challenged the calculation of overbreak volume and the rates applied. SW has reviewed its estimate and we understand that the standard cost adjusted for these issues would be £ 828,227.65.
6. For clarity, the calculation of on-costs relative to the percentages reported in the CBS are set out below.
7. The denominator used is one unit as set out in the Cost Base specification.

Cost item	Percentage	Item cost	Cumulative cost
Total direct costs including site specifics		386,526	386,526
Contractor's on-costs	44.12%	170,535	557,062
Delivery partner on-costs	41.51%	231,236	788,298
SW corporate on-costs	4.29%	33,818	822,116
Tender to out-turn adjustment	1.02%	8,386	830,501

#### **A10.4 Item 8.3 - Combined sewer overflow chamber with powered screen**

##### ***A10.4.1 Key Points***

1. For the Final Cost Base, SW has:
  - a. Amended the excavation volumes to allow for construction in an unsupported open excavation.
  - b. Applied the UID on-cost percentages.
2. The direct costs for the estimate has been costed using ADP tender rates described in Section A3.3 above supported by current quotations.
3. SW has prepared a detailed scope of works based on its standard design for CSOs. SW has assumed ideal conditions and has omitted any costs for supporting the excavation during the construction of the chamber.
4. SW has reviewed its estimate for excavation volume and excavation rates and we understand that the standard cost adjusted for these issues would be £ 102,683.19.
5. The denominator used is one unit as set out in the Cost Base specification.

### ***A10.4.2 General information***

SW has prepared a detailed scope for a CSO chamber including dimensioned drawings and detailed quantity estimates. The scope is based on a rectangular in-situ concrete chamber. The plan dimensions of the chamber are based on a Scottish Water standard drawing for CSO chambers taking account of WAPUG guidance and current framework supply contracts for powered screens.

The weir level in the proposed screen chamber is 900 mm above the invert of the incoming 600 mm diameter pipe. The screen sized for a flow of 630 l/s at 80% efficiency to allow for partial blinding. The proposed screen comes in modular units and the length install is 25% greater than the theoretical length required to deliver the design flow.

The screen chamber has been designed with 300 mm thick walls and 200 mm thick roof and base slab. Typical drawings provided by Scottish Water indicate that walls and roof slabs of similar chambers constructed are 300 mm and base slabs are 500 mm.

SW has allowed for 0.6 m working room around the chamber an excavation and has assumed side slopes of 60 degrees from the horizontal unsupported over 2.5 m deep. These assumptions are based on SW's interpretation of ideal ground conditions. We have not experienced similar conditions except in soft rock excavation.

The estimate assumes that the new CSO will be constructed off-line adjacent to the existing sewer. It is assumed that the connections to the existing sewer can be made at existing manholes with 10m of inlet and 10 m of pass forward pipework provided. SW has not allowed for CSO manholes chambers adjacent to the CSO inlet and outlet and has assumed that the incoming pipe can enter the CSO chamber at an angle to the axis of the channel. The estimate allows for 20 m of overflow pipe to a new manhole on an existing storm sewer.

SW has assumed that the foul flow outlet pipe will be designed to throttle flow from the CSO and it has not provided a throttle mechanism in the CSO chamber.

### ***A10.4.3 Direct costs***

The standard cost estimate has been priced using a mix of ADP tender rates as described in Section A4.4 above supplemented by specific quotations for mechanical plant.

The cost for the screen is taken from a specific quotation obtained for the Cost Base. SW has provided a copy of a frameworks supply contract and the quote for a current project to demonstrate that the supplier quotation is representative of its current costs.

We challenged SW on the calculation of overbreak volume based on the assumptions set out above and the rates applied. SW has reviewed its estimate and we understand that the standard cost adjusted for these issues would be £102,683.19.

### ***A10.4.4 Adjustments and exclusions***

The standard cost estimate is based on a detailed scope of work prepared in line with the standard cost estimate. It has not been necessary to include any further adjustments or exclusions in terms of scope.

The ADP tender rates used to price the standard cost were tendered in March 2005. The adjustment to inflate the estimate to mid 2007-08 prices has been included in the direct costs.

#### ***A10.4.5 Indirect costs***

The in-direct costs applied to this estimate (including corporate overheads) are described in Section A4.3.3. We understand that the percentages are applied as follows. The distribution of these costs between the categories set out in the CBS is described in Section A4.3.6. SW has applied the on-cost percentages relating to UID projects in the Investment Plan.

<b>Cost item</b>	<b>Percentage</b>	<b>Item cost</b>	<b>Cumulative cost</b>
Total direct costs including site specifics		48,795	48,795
Contractor's on-costs	44.12%	21,528	70,324
Delivery partner on-costs	41.51%	29,191	99,515
SW corporate on-costs	4.29%	4,269	103,784
Tender to out-turn adjustment	1.02%	1,059	104,843

#### ***A10.4.6 Corporate overheads***

The corporate on-costs are described with the indirect costs above.

#### ***A10.4.7 Confidence grade – Reporter assessment***

Our assessment of the confidence grade is set out below:

<b>Criteria</b>	<b>Company</b>	<b>Reporter Commentary</b>	<b>Reporter</b>
Scope	5	SW has recent experience of the construction of CSOs with powered screens.	5
Cost	4	The cost estimate is based on ADP tendered rates and specific quotations from framework suppliers.	4
Risk	3	A tender to outturn rate has been applied. This figure is specific to UID schemes.	3
Compliance	4	SW has based its estimate on a detailed scope of works developed for the standard cost. We have identified some concerns in regard to wall thickness used in the estimate..	3

### **A10.5 Item 8.4 - Replacement dry well pumps and motors for an existing pumping station, 30kW capacity**

#### ***A10.5.1 Key Points***

- SW has developed the estimate in precisely the same way as for the water pump unit cost in Section A 7.14., namely as a bottom up estimate. Rates and prices for major plant supply have been taken from direct quotations. Cost of installation and commissioning have been built up from productivity estimates with unit costs taken from framework or supplier contracts for Q&S11 inflated

by COPI. . Costs of the capital maintenance investment programme have generally been built up using cost curves and so it has not been possible for Scottish Water to demonstrate fully the consistency of the standard cost with that of the Investment Plan. However, we do acknowledge that budget prices have been obtained from direct quotations for framework suppliers using framework rates.

2. SW has priced on the basis that the installation forms part of a planned maintenance contract. For the first Cost Base report no allowance was made for design for pump replacement on an existing installation. However, an “average level” for design is now included in the overhead percentage, which may be higher than some other companies are assuming (see also (4) below).
3. An overall figure for all overheads of 94% of the base construction costs has been used for this standard cost. This is based on an average on-cost for all types of non-infrastructure work in the price band of the work and as such is not necessarily completely reflective of the actual on-costs for capital maintenance programmes of this type. This has been discussed in section A4.5.3
4. We believe that the inclusion of different categories of on-costs by different water companies can lead to significant uncertainty in any comparison between companies. We believe that regulators should carefully expose all estimates of on-costs used by all companies to ensure fairness in comparisons.
5. The denominator used is 30 kW as set out in the Cost Base specification.

#### ***A10.5.2 General information***

SW has developed the standard cost estimate as a bottom up estimate based on a detailed assessment of the standard cost specification.

A specific quotation has been obtained for a new fixed speed pump to meet the standard cost specification.

Detailed schedules of work were prepared for the erection and commissioning plus additional pipework, valves and plinths required by the standard cost specification.

The specifications for the electrical works was prepared by an electrical engineer working for Scottish Water’s delivery partner.

We believe that SW has complied with the standard cost specification.

#### ***A10.5.3 Direct costs***

SW obtained a quotation from one of its pump framework supplier. We confirmed that delivery was included in the quotation.

The associated RTU and ICA panels were obtained from quotations from other framework suppliers.

Cabling is limited in extent, with a direct cost of £200 for material.

Scottish Water has made one small adjustment to the man hours assumed for commissioning which is hardly material.

Installation costs were calculated from productivities assumed by the estimator multiplied by unit rates from the Scottish Water Solutions tender of Q1 2005 inflated by COPI. The installation costs total £2912 or 17.8% of the supply costs, a higher percentage than for Item 7.14 but which can be explained on the basis of the different supply costs of fixed a variable speed pumps and differences in replacing pumps as opposed to just fixing new pumps. We confirm that the build up of installation costs were similar in nature and consistent with the specification.

Scottish Water was not able to verify that these costs were consistent with those from completed projects. We believe that this part of the standard cost is subject to the greatest uncertainty and we would like Scottish Water to reconcile the difference between this item and item 7.14.

#### Adjustments and exclusions

SW has developed the standard cost as a bottom up estimate. No further adjustments or exclusions have been necessary to comply with the standard cost specification.

#### ***A10.5.4 Indirect costs***

The in-direct costs applied to this estimate (including corporate overheads) are described in Section A4.3.3. We understand that the percentages are applied as follows. The distribution of these costs between the categories set out in the CBS is described in Section A4.3.6.

Cost item	Percentage	Item cost	Cumulative cost
Total direct costs including site specifics		19,481.26	19,481.26
Contractor's on-costs	29.96%	5,836.59	25,317.85
Delivery partner on-costs	38.78%	9,818.26	35,136.11
SW corporate on-costs	4.48%	1,574.10	36,710.21
Tender to out-turn adjustment	3.06%	1,123.33	37,833.54

#### ***A10.5.5 Corporate overheads***

The corporate on-costs are described with the indirect costs above.

#### ***A10.5.6 Confidence grade – Reporter assessment***

Our assessment of the confidence grades are set out below:

Criteria	Company	Reporter Commentary	Reporter
Scope	3	We note that SW has reduced this grade from a 4 to a 3 since the first draft business plan. We understand that SW has done this because it has not carried out replacements in this size band. On this basis we concur that the 3 band is reasonable.	3
Cost	4	Costs have been built up from framework budget prices with individual estimating of installation costs. Overhead costs are now consistent with average tendered overhead costs for non-	4

Criteria	Company	Reporter Commentary	Reporter
		infrastructure expenditure. These average on-costs are not necessarily fully consistent with capital maintenance programmes, which may be marginally lower.. The confidence grade represents our interpretation of the WIC guidance and does not reflect an assessment of the accuracy of the answer.	
Risk	3	A small risk allowance has been included at the same rate as other standard non-infrastructure costs. Our assessment of the confidence grade arises from the WIC definitions and ignores the likely materiality of any risk analysis to this particular standard cost.	3
Compliance	4	The estimate is based on a bottom up build up at sub-process level which should allow compliance with the definition.	4

## A10.6 Item 8.5 - Replacement submersible pumps for an existing pumping station, 12kW capacity

### A10.6.1 Key Points

1. SW has developed the estimate in precisely the same way as for the water pump unit cost in Section A 7.14., namely as a bottom up estimate. Rates and prices for major plant supply have been taken from direct quotations. Cost of installation and commissioning have been built up from productivity estimates with unit costs taken from framework or supplier contracts for Q&S11 inflated by COPL. . Costs of the capital maintenance investment programme have generally been built up using cost curves and so it has not been possible for Scottish Water to demonstrate fully the consistency of the standard cost with that of the Investment Plan. However, we do acknowledge that budget prices have been obtained from direct quotations for framework suppliers using framework rates.
2. SW has priced on the basis that the installation forms part of a planned maintenance contract. For the first Cost Base report no allowance was made for design for pump replacement on an existing installation. However, an “average level” for design is now included in the overhead percentage, which may be higher than some other companies are assuming (see also (3) below).
3. An overall figure for all overheads of 94% of the base construction costs has been used for this standard cost. This is based on an average on-cost for all types of non-infrastructure work in the price band of the work and as such is not necessarily completely reflective of the actual on-costs for capital maintenance programmes of this type. This has been discussed in section A3.3.3.
4. We believe that the inclusion of different categories of on-costs by different water companies can lead to significant uncertainty in any comparison between companies. We believe that regulators should carefully expose all estimates of on-costs used by all companies to ensure fairness in comparisons.
5. The denominator used is 12 kW as set out in the Cost Base specification.

### ***A10.6.2 General information***

SW has developed the standard cost estimate as a bottom up estimate based on a detailed assessment of the standard cost specification.

A specific quotation has been obtained for a new fixed speed pump to generally meet the standard cost specification. However, Scottish Water has stated that the pump, which is to its specification is only capable of passing a 50mm solid. Scottish Water further notes that many pumps of this particular type have been installed for water companies in England and Wales.

Detailed schedules of work were prepared for the erection and commissioning.

The specification for the electrical works was prepared by an electrical engineer working for Scottish Water's delivery partner.

We believe that SW has complied with the standard cost specification other than for the solids handling capacity of the pump. We accept that the pump costed is consistent with Scottish Water specification.

### ***A10.6.3 Direct costs***

Scottish Water has not altered the base information used to build up the direct costs.

SW obtained a quotation from one of its pump framework suppliers. We confirmed that delivery was included in the quotation.

The associated RTU and ICA panels were obtained from quotations from other framework suppliers.

Cabling is limited in extent, with a direct cost of £200 for material.

Installation costs were calculated from productivities assumed by the estimator multiplied by unit rates from the Scottish Water Solutions tender of Q1 2005 inflated by COPI. The installation costs total £2049 or 16.8% of the supply costs, a higher percentage than for Item 7.14. but similar to item 8.4. This can be explained by differences in supply costs.

Scottish Water was not able to verify that these costs were consistent with those from completed projects. We believe that this part of the standard cost is subject to the greatest uncertainty.

### ***A10.6.4 Adjustments and exclusions***

SW has developed the standard cost as a bottom up estimate. No further adjustments or exclusions have been necessary to comply with the standard cost specification.

### ***A10.6.5 Indirect costs***

The in-direct costs applied to this estimate (including corporate overheads) are described in Section A4.3.3. We understand that the percentages are applied as follows. The distribution of these costs between the categories set out in the CBS is described in Section A4.3.6.

Cost item	Percentage	Item cost	Cumulative cost
Total direct costs including site specifics		14,353.30	14,353.30
Contractor's on-costs	29.96%	4,300.25	18,653.55
Delivery partner on-costs	38.78%	7,233.85	25,887.39
SW corporate on-costs	4.48%	1,159.76	27,047.15
Tender to out-turn adjustment	3.06%	827.64	27,874.79

Indirect costs have been applied as for Item 7.14 and similar considerations apply.

#### ***A10.6.6 Corporate overheads***

The corporate on-costs are described with the indirect costs above.

#### ***A10.6.7 Confidence grade – Reporter assessment***

Our assessment of the confidence grades are set out below:

Criteria	Company	Reporter Commentary	Reporter
Scope	5	We note that SW has increased this grade from a 4 to a 5 since the first draft business plan. We understand that SW has done this because it believes that it has considerable experience in similar projects. This is accepted. While agreeing to the band definition we note that this bottom up estimate does not draw directly on that knowledge.	4
Cost	4	Costs have been built up from framework budget prices with individual estimating of installation costs. Overhead costs are now consistent with average tendered overhead costs for non-infrastructure expenditure. These average on-costs are not necessarily fully consistent with capital maintenance programmes, which may be marginally lower. The confidence grade represents our interpretation of the WIC guidance and does not reflect an assessment of the accuracy of the answer.	4
Risk	3	A small risk allowance has been included at the same rate as other standard non-infrastructure costs. Our assessment of the confidence grade arises from the WIC definitions and ignores the likely materiality of any risk analysis to this particular standard cost.	3
Compliance	4	The estimate is based on a bottom up build up at sub-process level which should allow compliance with the definition.	4

### **A10.7 Item 8.6 - Upsize existing wet well pumping station from 12kW to 30kW capacity**

#### ***A10.7.1 Key Points***

- SW has developed the estimate in precisely the same way as for the water pump unit cost in Section A 7.14 as well as the two standard costs immediately above, namely as a bottom up estimate. Rates and prices for major plant supply have been taken from direct quotations. Cost of installation and commissioning have been built up from productivity estimates with unit costs taken from framework

or supplier contracts for Q&S11 inflated by COPI. Costs of the capital maintenance investment programme have generally been built up using cost curves and so it has not been possible for SW to demonstrate fully the consistency of the standard cost with that of the Investment Plan. However, we do acknowledge that budget prices have been obtained from direct quotations for framework suppliers using framework rates.

2. SW has priced on the basis that the installation forms part of a planned maintenance contract. For the first Cost Base report no allowance was made for design for pump replacement on an existing installation. However, an “average level” for design is now included in the overhead percentage, which may be higher than some other companies are assuming (see also (3) below).
3. An overall figure for all overheads of 94% of the base construction costs has been used for this standard cost. This is based on an average on-cost for all types of non-infrastructure work in the price band of the work and as such is not necessarily completely reflective of the actual on-costs for capital maintenance programmes of this type. This has been discussed in section A3.3.3.
4. We believe that the inclusion of different categories of on-costs by different water companies can lead to significant uncertainty in any comparison between companies. We believe that regulators should carefully expose all estimates of on-costs used by all companies to ensure fairness in comparisons.
5. The denominator used is 30 kW as set out in the Cost Base specification.

#### ***A10.7.2 General information***

SW has developed the standard cost estimate as a bottom up estimate based on a detailed assessment of the standard cost specification.

A specific quotation has been obtained for a new fixed speed pump to meet the standard cost specification.

Detailed schedules of work were prepared for the erection and commissioning plus additional guide-rails and chains as required by the standard cost specification.

The specification for the electrical works was prepared by an electrical engineer working for Scottish Water’s delivery partner.

#### ***A10.7.3 Direct costs***

Apart from a slight reduction in installation man hours, which have little impact on the standard cost, SW has made no amendments to the cost build up presented for the first draft business plan.

SW obtained a quotation from one of its pump framework supplier. We confirmed that delivery was included in the quotation.

The associated RTU and ICA panels were obtained from quotations from other framework suppliers.

Cabling is limited in extent, with a direct cost of £200 for material.

Hire costs are consistent with framework supplier rates.

Installation costs were calculated from productivities assumed by the estimator multiplied by unit rates from the Scottish Water Solutions tender of Q1 2005 inflated by COPI. The installation costs total £3089 or 12.97% of the supply costs, a higher percentage than for Item 7.14 but smaller than other WW pump replacements. This is largely due to the different supply costs and not due to major differences in installation costs.

Scottish Water was not able to verify that these costs were consistent with those from completed projects. We believe that this part of the standard cost is subject to the greatest uncertainty and we would like Scottish Water to reconcile the difference between this item and item 7.14.

#### ***A10.7.4 Adjustments and exclusions***

SW has developed the standard cost as a bottom up estimate. No further adjustments or exclusions have been necessary to comply with the standard cost specification.

#### ***A10.7.5 Indirect costs***

The in-direct costs applied to this estimate (including corporate overheads) are described in Section A4.3.3. We understand that the percentages are applied as follows. The distribution of these costs between the categories set out in the CBS is described in Section A4.3.6.

Cost item	Percentage	Item cost	Cumulative cost
Total direct costs including site specifics		27,150.62	27,150.62
Contractor's on-costs	29.96%	8,134.33	35,284.95
Delivery partner on-costs	38.78%	13,683.50	48,968.45
SW corporate on-costs	4.48%	2,193.79	51,162.24
Tender to out-turn adjustment	3.06%	1,565.56	52,727.80

#### ***A10.7.6 Corporate overheads***

The corporate on-costs are described with the indirect costs above.

#### ***A10.7.7 Confidence grade – Reporter assessment***

Our assessment of the confidence grades are set out below:

Criteria	Company	Reporter Commentary	Reporter
Scope	5	We note that SW has increased this grade from a 4 to a 5 since the first draft business plan. We understand that SW has done this because it believes that it has considerable experience in similar projects. This is accepted. While agreeing to the band definition we note that this bottom up estimate does not draw directly on that knowledge.	5
Cost	4	Costs have been built up from framework budget prices with individual estimating of installation costs. Overhead costs are now	4

Criteria	Company	Reporter Commentary	Reporter
		consistent with average tendered overhead costs for non-infrastructure expenditure. These average on-costs are not necessarily fully consistent with capital maintenance programmes, which may be marginally lower. The confidence grade represents our interpretation of the WIC guidance and does not reflect an assessment of the accuracy of the answer.	
Risk	3	A small risk allowance has been included at the same rate as other standard non-infrastructure costs. Our assessment of the confidence grade arises from the WIC definitions and ignores the likely materiality of any risk analysis to this particular standard cost.	3
Compliance	4	The estimate is based on a bottom up build up at sub-process level which should allow compliance with the definition.	4

## **A10.8 Item 8.7 - Replacement motor control centre for an existing pumping station, 90kW total installed motor capacity**

### ***A10.8.1 Key Points***

1. SW has developed this estimate in exactly the same manner as for Item 4.14.
2. SW has developed the estimate as a bottom up estimate. Rates and prices for major plant supply have been taken from direct quotations. Costs of installation and commissioning have been built up from productivity estimates with unit costs taken from framework or supplier contracts. The cost has significantly increased due to the higher level of overheads assigned.
3. SW has priced on the basis that the installation forms part of a planned maintenance contract. For the first Cost Base report no allowance was made for design for MCC replacement on an existing installation. However, an “average level” for design is now included in the overhead percentage, which may be higher than some other companies are assuming (see also (5) below).
4. An overall figure for all overheads of 94% of the base construction costs has been used for this standard cost. This is based on an average on-cost for all types of non-infrastructure work in the price band of the work and as such is not necessarily completely reflective of the actual on-costs for capital maintenance programmes of this type. It is different to the similar cost in the water service due to the general differences between the water and wastewater service. This has been discussed in section A3.3.3. .
5. We believe that the inclusion of different categories of on-costs by different water companies can lead to significant uncertainty in any comparison between companies. We believe that regulators should carefully expose all estimates of on-costs used by all companies to ensure fairness in comparisons.
6. The denominator used is 1 MI as set out in the Cost Base specification.

**A10.8.2 General information**

SW has developed the standard cost estimate as a bottom up estimate based on a detailed assessment of the standard cost specification.

Specific quotations have been obtained for the MCC and other major plant items to meet the standard cost specification.

Detailed schedules of work were prepared for the erection and commissioning.

The specifications for erection and commissioning of the electrical works were prepared by an electrical engineer working for Scottish Water's Cost Consultant.

We believe that SW has complied with the standard cost specification

**A10.8.3 Direct costs**

SW obtained one quotation from its electrical panel framework supplier (as used for Item 4.14).

The cost of the temporary starters is based on 2 separate starters and not a temporary control panel.

Installation labour costs were calculated from productivities assumed by the estimator multiplied by unit rates from the Scottish Water Solutions tender of Q1 2005 inflated by COPI. The installation costs including the provision of temporary equipment total £3603 or 14% of the supply costs. This is lower than the equivalent standard cost for the water service. The difference can largely be explained by the need for simpler, fixed speed temporary drives.

Scottish Water was not able to verify that installation costs were consistent with those from completed projects. We believe that this part of the standard cost is subject to the greatest uncertainty.

**A10.8.4 Adjustments and exclusions**

SW has developed the standard cost as a bottom up estimate. No further adjustments or exclusions have been necessary to comply with the standard cost specification.

**A10.8.5 Indirect costs and corporate overheads**

Cost item	Percentage	Item cost	Cumulative cost
Total direct costs including site specifics		28,426.7	28,426.7
Contractor's on-costs	29.96%	8,516.6	36,943.3
Delivery partner on-costs	38.78%	14,326.6	51,269.9
SW corporate on-costs	4.48%	2,296.9	53,566.8
Tender to out-turn adjustment	3.06%	1,639.1	55,205.9

Indirect costs and corporate overheads have been applied as per Item 8.4 above and our comments made in that section apply.

#### ***A10.8.6 Confidence grade – Reporter assessment***

Our assessment of the confidence grades are set out below:

Criteria	Company	Reporter Commentary	Reporter
Scope	4	We are unaware whether SW has carried out MCC replacements in this size band in the recent past but has undoubtedly done so in prior periods. However, for this standard cost, costs have been built from the bottom up with little reference to actual past costs.	4
Cost	4	Costs have been built up from framework budget prices with individual estimating of installation costs. Overhead costs are now consistent with average tendered overhead costs for non-infrastructure expenditure. These average on-costs are not necessarily fully consistent with capital maintenance programmes, which may be marginally lower. The confidence grade represents our interpretation of the WIC guidance and does not reflect an assessment of the accuracy of the answer.	4
Risk	3	A small risk allowance has been included at the same rate as other standard non-infrastructure costs. Our assessment of the confidence grade arises from the WIC definitions and ignores the likely materiality of any risk analysis to this particular standard cost.	3
Compliance	4	The estimate is based on a bottom up build up at a sub-process level which should allow compliance with the definition.	4

#### **A10.9 Item 8.8 - First time rural sewage treatment, p.e. 200**

SW notes that first time provision is not part of the 2010-14 Investment Plan.

While SW has undertaken work of this type in Q&S2 and Q&S3A, first time rural sewage treatment does not form part of the 2010-14 Investment Plan. However, the 2010-14 Investment Plan includes process improvements for a range of small sewage treatment works. Scottish Water noted that its Q programme for small sites generally involves phosphorus and ammonia reduction while first time rural treatment involves primary treatment with sometimes secondary treatment. We accept that there are significant differences in the two programmes and the type and scale of work involved and conclude that it is reasonable to omit this item from the Cost Base.

**A10.10 Item 8.9 - Installation of denitrification at existing secondary works, p.e. 40,000**

SW notes that wastewater denitrification is uncommon in Scotland and that this type of work is not part of the 2010-14 Investment Plan

We believe that SW's statement is reasonable and consistent with the 2010-14 Investment Plan

**A10.11 Item 8.10 - Additional nutrient removal at existing secondary works, p.e. 4,000*****A10.11.1 Key Points***

1. For the Final Cost Base, SW has added storage for the additional sludge production for a 24 hour period.
2. The standard cost estimate has been prepared using the EES cost functions described in Section A4.3 above.
3. The denominator used is 240 kg.BOD/d as set out in the Cost Base specification.

***A10.11.2 General information***

The standard cost estimate is based on the provision of a ferric sulphate dosing plant to precipitate phosphorous from the wastewater.

A detailed scope of work has not been prepared. The standard cost estimate has been costed using a single cost function for ferric sulphate dosing which was used to cost the Investment Plan and the MEAV.

The cost function has a yardstick of kg.ferric solution dosed per day. SW has demonstrated that the calculation of the yardstick quantity for the Cost Base is consistent with the calculation of yardstick quantities for the Investment Plan.

The ferric dosing cost function is a GAP model. It is inclusive of pipework, cabling and control panel.

SW has included a separate item for telemetry.

SW has included the cost of the provision of 24 hour sludge storage for the additional sludge arising from the addition of ferric sulphate. SW has estimated the quantity of additional sludge arising as 55 kg/d based on the ferric to phosphorous dosing ratio assumed in the Investment Plan. This has been converted to 2.2 m<sup>3</sup> storage over 24 hours based on a sludge thickness of 2.5

In line with the Cost Base specification, SW has assumed that alkalinity is sufficiently high and that additional alkalinity dosing will not be required.

***A10.11.3 Direct costs***

The estimate has been costed using the Engineering Estimating System cost functions described in Section A4.3 above.

The main cost function used to develop this standard cost is based on a series of generic bottom up estimates used to fill a gap in historic cost data (referred to as a GAP model). The same data set was used to develop cost functions used in the Cost Base and the Investment Plan.

The detailed cost estimates identify items of scope which are not required for the Cost Base and these were excluded from the data set to generate the Cost Base cost function. We reviewed the items excluded from the Cost Base cost function and believe that reasonable exclusions have been applied.

The direct cost of sludge storage has been based on the EES cost function for a sewage pumping wet-well. SW has not used its sludge holding tank cost function because the volume required to comply with the Cost Base specification is materially lower than the sludge tanks constructed in the past which form the basis of this cost function.

The main element of direct costs are estimated at COPI = 161. SW has included an item to convert the direct costs to COPI = 162.5.

#### ***A10.11.4 Adjustments and exclusions***

All scope items, site specific costs and inflation adjustments are included under the direct cost items. No further adjustments or exclusions are necessary.

#### ***A10.11.5 Indirect costs***

The in-direct costs applied to this estimate (including corporate overheads) are described in Section A4.3.3. We understand that the percentages are applied as follows. The distribution of these costs between the categories set out in the CBS is described in Section A4.3.6.

Cost item	Percentage	Item cost	Cumulative cost
Total direct costs including site specifics		107,378.70	107,378.70
Contractor's on-costs	29.96%	32,170.66	139,549.36
Delivery partner on-costs	38.78%	54,117.24	193,666.60
SW corporate on-costs	4.48%	8,676.26	202,342.86
Tender to out-turn adjustment	3.06%	6,191.69	208,534.56

#### ***A10.11.6 Corporate overheads***

The corporate on-costs are described with the indirect costs above.

#### ***A10.11.7 Confidence grade – Reporter assessment***

Our assessment of the confidence grade is set out below:

Criteria	Company	Reporter Commentary	Reporter
Scope	5	SW has experience of this type of work. However SW has prepared the scope of works and cost estimates from a bottom up estimate.	4
Cost	4	The main underlying cost model has been developed from bottom up estimates which draw on current tendered rates and framework	4

Criteria	Company	Reporter Commentary	Reporter
		contracts.	
Risk	3	A tender to outturn rate has been applied. This figure is specific to sewerage non-infrastructure work.	3
Compliance	4		4

## A10.12 Item 8.11 - Additional ammonia removal at existing secondary works, p.e. 2,000

### A10.12.1 Key Points

1. The estimate has been costed using the Engineering Estimating System cost functions described in Section A4.3 above.
2. The estimate is based on an outline process design which uses technology and design parameters which are used on similar schemes in Q&S3A.
3. The denominator used is 120 kg.BOD/d as set out in the Cost Base specification.

### A10.12.2 General information

The standard cost estimate is based on a tertiary filter using structured plastic media to nitrify the secondary effluent.

SW has included a lift pumping station, designed for the FFT immediately after the existing humus tanks to lift the flow into the new filter. The treated effluent from the filter will discharge to the same pumping station to allow an adequate filter wetting rate to be maintained during low flow to secure nitrification

The key criteria used to determine the size of the filter is the ammonia load. SW has calculated a design ammonia load from the average flow times the 95%-ile compliance of the filter (20 mg/l). An average flow of 1.25 \* DWF has been assumed (500 m<sup>3</sup>/d) giving a design load of 10 kg.NH<sub>3</sub>/day.

We note that the assessment of the ammonia design load is open to interpretation. Others might calculate the ammonia load based on a range of flows from dry-weather flow to flow to full treatment. A range of ammonia concentrations could be considered from the 95%-ile used by SW to (for example) an assumption that the average ammonia concentration is of the order of half the 95%-ile. We believe that there is scope for different interpretations of the design criteria which could affect the comparability of the standard costs across the industry.

SW has allowed for a recycle pump to maintain wetting flows over the tertiary filter. SW has not included the ammonia in the recycle in the ammonia load used to determine the size of the filter.

SW has assumed that a humus tank will not be required after the tertiary nitrifying filter. We believe that this is reasonable for the 25:35 BOD:SS standard required.

We have reviewed the key design parameters and assumptions above against SW's design standards and the methods used to size plant for SR10 and concluded that the approach to the Cost Base design is consistent with company practice.

SW has not allowed for a building or kiosk to house the MCC required for the pumping station. SW has assumed that this equipment can be housed in an existing building.

SW has added a percentage of other direct costs to cover site specific items for wastewater non-infrastructure projects which are not excluded by the Cost Base specification. This includes the valve chamber and return pipeline for the recycle pumping station.

SW has not made any specific allowance for the MCC required for the new pumping station. Based on our sample audits, we are not convinced that the pumping station cost function allows for the MCC.

SW has allowed for the provision of telemetry to control the new pumping station through a telemetry site specific cost function.

#### ***A10.12.3 Direct costs***

The estimate has been costed using the Engineering Estimating System cost functions described in Section A4.3 above.

The main cost function is a combined cost function for all types of filter media and is not specific for the plastic media included in the standard cost estimate.

The main element of direct costs are estimated at COPI = 161. SW has included an item to convert the direct costs to COPI = 162.5.

#### ***A10.12.4 Adjustments and exclusions***

All scope items, site specific costs and inflation adjustments are included under the direct cost items. No further adjustments or exclusions are necessary.

#### ***A10.12.5 Indirect costs***

The in-direct costs applied to this estimate (including corporate overheads) are described in Section A4.3.3. We understand that the percentages are applied as follows. The distribution of these costs between the categories set out in the CBS is described in Section A4.3.6.

<b>Cost item</b>	<b>Percentage</b>	<b>Item cost</b>	<b>Cumulative cost</b>
Total direct costs including site specifics		96,024.10	96,024.10
Contractor's on-costs	29.96%	28,768.82	124,792.92
Delivery partner on-costs	38.78%	48,394.69	173,187.61
SW corporate on-costs	4.48%	7,758.81	180,946.42
Tender to out-turn adjustment	3.06%	5,536.96	186,483.38

***A10.12.6 Corporate overheads***

The corporate on-costs are described with the indirect costs above.

***A10.12.7 Confidence grade – Reporter assessment***

Our assessment of the confidence grade is set out below:

Criteria	Company	Reporter Commentary	Reporter
Scope	5	SW has experience of this type of work. However, the scope of works is embedded in the cost function with a significant element of AR04 data.	4
Cost	4	The main cost functions rely on a limited number of historic data points.	4
Risk	3	A tender to outturn rate has been applied. This figure is specific to sewerage non-infrastructure work.	3
Compliance	4	We do not believe that the cost functions allow for the MCC necessary for the new pumping station.	3

**A10.13 Item 8.12 - Replacement UV disinfection at existing treatment works, p.e. 5,000*****A10.13.1 Key Points***

1. For the Final Cost Base, SW has revised the estimate for treatment of 4500 m<sup>3</sup>/d to full treatment. SW has replaced the previous allowance for a new UV channel with an allowance for minor civils works associated with replacing the UV plant.
2. The standard cost estimate is based on a revised quotation from a framework supplier to Scottish Water which Scottish Water obtained specifically for the purpose of completing the Cost Base.
3. SW has allowed for minor civils works associated with replacing the UV plant.
4. The denominator used is 4500 m<sup>3</sup>/d as set out in the Cost Base specification.

***A10.13.2 General information***

The standard cost estimate is based on a quotation from a framework supplier to Scottish Water which Scottish Water obtained specifically for the purpose of completing the Cost Base.

The quotation for the direct cost of the UV plant has not reduced materially for the revised treated flow of 4500 m<sup>3</sup>/d. We challenged SW to demonstrate that the quotation was consistent with prices received in its framework tender for UV plant. Scottish Water provided a copy of their current framework agreement and explanatory text. Differences in flow definition and specification make it difficult to draw direct comparisons between the framework and the Cost Base. However, we believe that the comparison indicates that the estimate included in the Cost Base is high when compared with the framework. SW has

advised us that the plant is imported and their supplier has indicated that any reduction associated with reduced flow has been off set by the weakening of the pound against the euro.

During our audit we reviewed the correspondence between Scottish Water and the framework supplier including the quotation received. The specification issued by Scottish Water is a reproduction of the Cost Base specification and is identified as a Cost Base item.

The quotation received covers the supply, installation and commissioning of the plant. The quotation includes the provision of stand-by capacity to allow for maintenance. The quotation allows for the use of existing compressors which is not specifically stated in the Cost Base specification.

SW has allowed direct costs of £250 for minor civils works associated with the replacement of the UV plant. No specific scope of work has been identified. We recommend that this assumption is reviewed by WICS against other standard cost estimates used to determine comparative efficiency.

#### ***A10.13.3 Direct costs***

The direct costs are based on a supplier's quotation.

The quotation was obtained at February 2009. SW has deflated the estimate to 2007-08 prices using average annual RPI indices as follows:

2007-08	208.59
2008-09	214.54
Deflation factor	0.9722

SW has then inflated the estimates from COPI = 161 to COPI = 162.5. We note the use of RPI to deflate current estimates to mid 2007-08 prices. We note the use of year average RPI indices to deflate estimates obtained at a specific time. Having deflated the estimates to mid 2007-08 prices, we see no need to apply an additional factor to inflate prices from COPI = 161 to COPI = 162.5.

#### ***A10.13.4 Adjustments and exclusions***

The standard cost estimate is based on a detailed scope of work prepared in line with the standard cost estimate. It has not been necessary to include any further adjustments or exclusions in terms of scope.

#### ***A10.13.5 Indirect costs***

The in-direct costs applied to this estimate (including corporate overheads) are described in Section A4.3.3. We understand that the percentages are applied as follows. The distribution of these costs between the categories set out in the CBS is described in Section A4.3.6.

Cost item	Percentage	Item cost	Cumulative cost
Total direct costs including site specifics		116,736	116,736
Contractor's on-costs	29.96%	34,974	151,710
Delivery partner on-costs	38.78%	58,833	210,543

Cost item	Percentage	Item cost	Cumulative cost
SW corporate on-costs	4.48%	9,432	219,975
Tender to out-turn adjustment	3.06%	6,731	226,706

#### ***A10.13.6 Corporate overheads***

The corporate on-costs are described with the indirect costs above.

#### ***A10.13.7 Confidence grade – Reporter assessment***

Our assessment of the confidence grade is set out below:

Criteria	Company	Reporter Commentary	Reporter
Scope	4	Scottish Water has limited experience of similar work and has relied on a framework supplier to scope the works.	4
Cost	3	Costs are based on single supplier quotation.	3
Risk	3	A tender to outturn rate has been applied. This figure is specific to sewerage non-infrastructure work.	3
Compliance	4	The supplier quotation is provided against the against the Cost Base specification.	4

### **A10.14 Item 8.13 - Replacement of sewage treatment works inlet screens**

#### ***A10.14.1 Key Points***

1. For SW has:
  - a. Included a revised quotation for duty and standby screenings handling plant.
  - b. Deflated the main plant items from quotation date to mid 2007-08 prices.
  - c. Amended the denominator to one unit.
2. The standard cost estimate is based on a quotation from a framework supplier to Scottish Water which Scottish Water obtained specifically for the purpose of completing the Cost Base.
3. The denominator used is one unit as set out in the Cost Base specification.

#### ***A10.14.2 General information***

The standard cost estimate is based on quotations which Scottish Water obtained specifically for the purpose of completing the Cost Base.

During our audit we reviewed the correspondence between Scottish Water and its framework suppliers including the quotations received. The specifications issued by Scottish Water are a reproduction of the Cost Base specification and are identified as a Cost Base items.

The standard cost estimate allows for two screens, and duty and standby screening handling facilities and booster pump set for washwater.

The booster pump set includes variable speed drives. Scottish Water has confirmed that variable speed pumps are necessary to provide washwater for the screens and screening handling. The pump quotation provides the flow necessary to run the screens and screening handling plant.

The quotation is based on local control panels for the three main items of plant (screens, screening handling and booster pumps). It is assumed that separate power supplies are available in the existing MCC to provide power to the plant.

#### ***A10.14.3 Direct costs***

The direct costs are primarily based on quotations from current framework supplier's with some additional labour and materials to cable in and integrate the plant.

SW has obtained a revised quotation for duty/standby screenings handling plant to replace the cost of a duty only unit included in the Draft Final Cost Base. The cost of duty/standby plant is 37% greater than the duty only unit included in the previous submission. We challenged SW to demonstrate that similar prices for duty/standby screenings handling units have had been obtained in practice. SW responded by providing framework documentation to support the rates used.

The various quotations were obtained at October 2008 for the screens, February 2009 for screenings handling and March 2008 for the booster pumps. SW has deflated the estimates (assuming that they are mid 2008-09 prices) to 2007-08 prices using average annual RPI indices as follows:

2007-08	208.59
2008-09	214.54
Deflation factor	0.9722

SW has then inflated the estimates from COPI = 161 to COPI = 162.5. We note the use of RPI to deflate current estimates to mid 2007-08 prices. We note the use of year average RPI indices to deflate estimates obtained at specific times. Having deflated the estimates to mid 2007-08 prices, we see no need to apply an additional factor to inflate prices from COPI = 161 to COPI = 162.5.

#### ***A10.14.4 Adjustments and exclusions***

The standard cost estimate is based on a detailed scope of work prepared in line with the standard cost estimate. It has not been necessary to include any further adjustments or exclusions in terms of scope.

**A10.14.5 Indirect costs**

The in-direct costs applied to this estimate (including corporate overheads) are described in Section A4.3.3. We understand that the percentages are applied as follows. The distribution of these costs between the categories set out in the CBS is described in Section A4.3.6.

Cost item	Percentage	Item cost	Cumulative cost
Total direct costs including site specifics		160,610	160,610
Contractor's on-costs	29.96%	48,119	208,729
Delivery partner on-costs	38.78%	80,945	289,674
SW corporate on-costs	4.48%	12,977	302,652
Tender to out-turn adjustment	3.06%	9,261	311,913

**A10.14.6 Corporate overheads**

The corporate on-costs are described with the indirect costs above.

**A10.14.7 Confidence grade – Reporter assessment**

Our assessment of the confidence grade is set out below:

Criteria	Company	Reporter Commentary	Reporter
Scope	4	Scottish Water has limited experience of similar work and has relied on a framework supplier to scope the works	4
Cost	3	Costs are mainly based on supplier quotations.	3
Risk	3	A tender to outturn rate has been applied. This figure is specific to sewerage non-infrastructure work.	3
Compliance	4	The supplier quotation is against the Cost Base specification.	3

**A10.15 Item 8.14 - Extension to existing conventional sludge treatment facility, additional throughput 3 ttds per annum**

SW has not completed a standard cost estimate for an extension to existing conventional sludge treatment facility, additional throughput 3 ttds per annum

SW notes that it does not have historical costs for sludge digestion and that this type of work is not part of the 2010-14 Investment Plan.

We believe that SW's statement is reasonable and consistent with the 2010-14 Investment Plan.

**A10.16 Item 8.15 - Refurbishment of sludge treatment plant - belt thickeners*****A10.16.1 Key Points***

1. We understand that Scottish Water would typically use drum thickeners for the duty specified for the Cost Base but has used belt thickeners from time to time. The standard cost estimate has been prepared for a belt thickener as required.
2. The standard cost estimate is based on a quotation from a supplier to Scottish Water which Scottish Water obtained specifically for the purpose of completing the Cost Base.
3. The denominator used is one unit as set out in the Cost Base specification.

***A10.16.2 General information***

The standard cost estimate is based on a quotation which Scottish Water obtained specifically for the purpose of completing the Cost Base. A single supplier which supplied similar equipment to Scottish Water in the past provided a quotation for all plant necessary for the standard cost estimate.

During our audit we reviewed the correspondence between Scottish Water and its suppliers including the quotations received. The specifications issued by Scottish Water are a reproduction of the Cost Base specification and are identified as a Cost Base items.

The standard cost estimate allows for belt thickeners, sludge feed pumps and thickened sludge transfer pumps, polymer preparation and dosing equipment, interconnecting pipework, Form 2 control panels and cabling. The quotation includes installation and commissioning.

SW has allowed for a duty thickener only. Standby plant is not explicitly required by the standard cost specification. We recommend that WICS confirms whether standby plant is included in similar estimates used for to determine comparative efficiency.

The standard cost specification does not feed sludge quantity or thickness. We consider SW's estimate of sludge mass to be reasonable for the 50,000 PE specified. SW has assumed a feed sludge thickness of 2% which is reasonable for a mixed primary and secondary sludge.

The thickening plant provided is based on operating times of 40 hours per week. We believe that this is typical of SW's operating philosophy although project quotations reviewed show that longer daily run hours have been considered. We note that it would be possible for others to assume more aggressive operating hours for the purpose of the Cost Base estimate and that this could have a material impact on the comparison for standard costs for different companies.

***A10.16.3 Direct costs***

The direct cost is primarily based on a supplier's quotations with some additional labour and materials to cable in and integrate the plant.

SW provided example quotations received for similar plant which indicated that the quotation received for the Cost Base was reasonable. The direct costs include an adjustment to take the cost estimate prepared at COPI = 161 to COPI = 162.5.

***A10.16.4 Adjustments and exclusions***

The standard cost estimate is based on a detailed scope of work prepared in line with the standard cost estimate. It has not been necessary to include any further adjustments or exclusions in terms of scope.

***A10.16.5 Indirect costs***

The in-direct costs applied to this estimate (including corporate overheads) are described in Section A4.3.3. We understand that the percentages are applied as follows. The distribution of these costs between the categories set out in the CBS is described in Section A4.3.6.

Cost item	Percentage	Item cost	Cumulative cost
Total direct costs including site specifics		122,256.20	122,256.20
Contractor's on-costs	29.96%	36,627.96	158,884.16
Delivery partner on-costs	38.78%	61,615.28	220,499.43
SW corporate on-costs	4.48%	9,878.37	230,377.81
Tender to out-turn adjustment	3.06%	7,049.56	237,427.37

***A10.16.6 Corporate overheads***

The corporate on-costs are described with the indirect costs above.

***A10.16.7 Confidence grade – Reporter assessment***

Our assessment of the confidence grade is set out below:

Criteria	Company	Reporter Commentary	Reporter
Scope	4	Scottish Water has limited experience of similar work and has relied on a framework supplier to scope the works.	4
Cost	4	Costs are mainly based on supplier quotations.	3
Risk	4	A tender to outturn rate has been applied. This figure is specific to sewerage non-infrastructure work...	3
Compliance	4	The supplier quotation is against the Cost Base specification.	3

## **A11 FORECAST EXPENDITURE (TABLES 1, 3, 5 & 7).**

### **A11.1 Introduction**

Our report relates to our audit of SW's Cost Base submission in January 2009. There have been minor changes to the percentage allocation of expenditure as SW finalised the detail of its 2<sup>nd</sup> draft Business Plan submission. We have not audit these changes.

For its second draft business plan Scottish Water has categorised its Investment Plan as core and non core. Its core plan comprises all essential projects as well as a number of desirable projects as defined by Ministers. At the time of preparation of the Cost Base Scottish Water had an ongoing estimate of its Investment Plan built up from detailed projects. This was not available to the same degree for the 1<sup>st</sup> draft business plan.

Within the overall total Scottish Water has defined some expenditure as “custom efficiency”: that is expenditure that Scottish Water believes should not be subjected to efficiency challenge as given by the Cost Base but defined in other ways.

“Custom efficiency” expenditure comprises:

1. Q&S4 start early projects.
2. All M&G spend.
3. Other spend that Scottish Water believes should not be benchmarked using the Cost Base, for example:
  - a. Infrastructure modelling for capital maintenance projects (water and wastewater).
  - b. Internal flooding as based on unit rate / property
  - c. Water quality studies
  - d. Service diversions payment to others.
  - e. Reasonable cost contributions
  - f. UID studies
  - g. Loch Ryan project.

This leaves a total of approximately 86% of the overall total that has been used to populate tables 1, 3, 5 and 7 of the Cost Base.

This is a very significant advance on the percentage that was used to populate the tables in the first Cost Base submission.

## A11.2 Allocation of costs into the tables

Scottish Water has developed a sophisticated coding system to allocate all costs to a large number of drivers including:

- Purpose codes agreed with stakeholders.
- Asset designation of infrastructure and non-infrastructure.
- Asset categories (water mains, WTW, sewers, WWTW etc)
- Asset lives.
- WIC codes.
- SR10 tables and lines.

These codes are used to allocate costs to the expenditure tables in the Cost Base, the asset code generally being used.

The Investment Plan is held in an MS-Access database. The data is held in data input sheets in MS-Excel then uploaded to the database. The Investment Plan has been built up at asset level across a number of workstreams. All the investment is held at asset level. Each line in the database is classed against a master list of 45 asset categories.

The investment has been mapped to the Cost Base tables using the asset category. Where a more detailed split is required this information is also held in the database e.g. for water treatment works the ground water/surface water data relating to the works and for infrastructure data the split between grassland, urban, etc. A series of queries has been set up within the database using the mapping to allocate the investment to the appropriate Cost Base line

Each defined project is entered into an Oracle database with the necessary drivers and percentages of expenditure assigned to each driver. The information is downloaded into spreadsheets which are used to analyse the data and allocate costs to the relevant table lines. As part of our review on the Cost Base we audited the allocation of projects to the relevant tables and were impressed by the thoroughness of the work. Provided that the original allocation by the engineer is correct we believe that costs have been properly allocated to the relevant lines in the tables. In most cases allocations are simple and self evident but in some cases more judgement is required. We briefly give further details against individual tables below.

### A11.3 Table 1 – Water mains forecast expenditure

Items in this table come from distribution assets (asset codes DIS and DISre).

Allocations to surface type are based on those derived by the water infrastructure team leaders.

### ***A11.3.1 Driver DW5 and capital maintenance drivers (CM)***

For the DW5 driver a detailed programme has been developed using a Pre Project Rehabilitation Appraisal (PRA) process. This has resulted in a detailed definition of mains to be rehabilitated for quality reasons at a water operational area level. At the same time deterioration modelling augmented by detailed information from pipe cut-outs resulted in a detailed definition of mains needing replacement. The two models were superimposed using GIS to give detailed estimates of mains to be relined and replaced within each water operational area. Within the GIS most pipes are allocated to a surface type and direct interrogation of the system was used to estimate the percentages of reline and replace within different surface categories within each water operational area.

This detailed approach was taken for all pipes appearing under the DW5 driver. Despite similar information to the DW5 driver being available for those pipes undergoing rehabilitation purely for capital maintenance reasons, Scottish Water has applied an average set of percentages for these pipes as shown below:

Grassland	0.029
Rural/suburban highway	0.387
Urban highway	0.130
Mains rehabilitation - relining	0.007
Mains rehabilitation – pipe insertion	0.447

This average is based on the average percentages of the SR06 rehabilitation programme presently being implemented by Scottish Water’s contracting arm CID.

We conclude that the allocations made under these drivers are a significant improvement on those reported for the first Cost Base submission. At a Company level the allocations for the capital maintenance pipe replacements are likely to be reasonable provided the new programme is spread geographically in a similar fashion to the current programme. We have not audited this point for the Cost Base.

### ***A11.3.2 Drivers WG4 and DW8***

The CS14 driver comprises a number of projects, some of which are reasonably well defined and some are not. For those projects which are well defined the team leader reviewed the proposed pipeline route on ordnance survey maps. For those projects which are currently not well defined the team leader reviewed the water resource zone in general against ordnance survey maps and came to a conclusion as to the likelihood that any pipeline would be in grassland. While there is clearly uncertainty regarding the pipeline routes and resulting ground conditions we believe that the allocation will be reasonable.

The DW8 driver comprises the provision of tanker fill points. This driver was well defined for 5 of the 8 sites and the percentage was derived from drawings of the proposed solutions.

## **A11.4 Table 3 – Water service – forecast expenditure by asset type**

Allocations in this table have generally been by asset codes used in the database. Assets allocated to each line in Table 3 are summarised in the table below:

Line No	Title	Assets included
1	Water resources	Aqueducts, dams and impounding reservoirs and raw water intakes asset codes
2	WTW – surface water	Water treatment works (surface water) asset code plus the secondary disinfection programme asset code (surface water)
3	WTW – ground water	Water treatment works (ground water) asset code plus the secondary disinfection programme asset code(ground water)
4	Treated water storage	Treated water storage asset code
5	Pumping stations	Ground water storage, raw water pumping and treated water pumping asset codes
6	Potable mains	Distribution asset codes
7	Communication pipes	Communication pipes asset code
8	Meters	Meter asset code
9	M&G	Not included as custom efficiency

The percentage in Line 9 is zero as M&G is regarded as “custom efficiency”.

We have reviewed the allocations and believe that the % have been correctly allocated to lines in this table.

#### **A11.5 Table 5 - Sewerage forecast expenditure**

Some 94% of the expenditure allocated to this table comes from capital maintenance projects. These have all been allocated to surface types as follows:

Grassland	0.04
Rural/suburban highway	0.09
Urban highway	0.02
No dig/reline	0.85

As for the water service the basis of the allocation is the current SR06 programme being implemented by CID. As for the water service we conclude that the allocations made under these drivers are a significant improvement on those reported for the first Cost Base submission. At a Company level the allocations for the capital maintenance pipe replacements are likely to be reasonable provided the new programme is spread geographically in a similar fashion to the current programme. We have not audited this point for the Cost Base.

The remaining 6% comes from 2 projects under the EC10A driver. 50% of the cost has been allocated to grassland and 50% to rural suburban. The allocations were made by the team leader using his judgement based on the fact that the work will be undertaken in rural areas. We believe that the allocation must be regarded as very approximate.

#### **A11.6 Table 7 - Wastewater service - forecast expenditure by asset type**

Allocations in this table have generally been by asset codes used in the database. Assets allocated to each line in Table 7 are summarised in the table below:

<b>Line No</b>	<b>Title</b>	<b>Assets included</b>
1	Sewers	Sewer asset code
2	Sewer structures	CSO, discharge outfalls, storm sewer ponds, sewer structure asset codes
3	Sewage pumping stations	Sewage pumping stations asset code
4	Sewage treatment works	Sewage treatment works asset code
5	Sea outfalls and headworks	Sea outfall asset code
6	Sludge treatment and disposal	Sludge treatment asset code
7	Management and general	Not included as custom efficiency

The percentage in Line 9 is zero as M&G is regarded as “custom efficiency”.

We have reviewed the allocations and believe that the % have been correctly allocated to lines in this table.

## A12 COMPARISON WITH 2005 STANDARD COST ESTIMATES

Scottish Water has not provided a comparison of the SR06 and SR10 standard required in Tables 9 and 10 of the SR10 Cost Base Submission. SW notes that the guidance specifically states that SW "...should not make any input to these tables. Only those cells that link to the CBS sheets are populated. Our submission complies with the guidance".

SW has provided commentary on the changes which relate to:

- the development of its costing systems from SR06, moving to the use of Scottish Water own data derived from recent framework tenders and target cost estimates;
- an updated set on on-cost percentages derived from the analysis of recent target cost estimates and project costs;
- some limited changes in the scope of works included in the standard cost estimates.

SW has not made any specific claims which relate changes in standard cost estimates from SR06 to improvements in efficiency.

## **ANNEX 1 – REPORTER GUIDANCE**

### ***Introduction***

*The Reporter should refer to the guidance in Section 3 for a general introduction to the format of SW's submission, cost base objectives and methodology including the cost breakdown structure (CBS). Appendix 1 includes examples (one for infrastructure and one for non-infrastructure) of completed CBS spreadsheets.*

### ***Role of Reporter***

*The Reporter shall give the SW cost base submission focused scrutiny and independently comment on aspects that are material to the cost base objectives (see Section 1). In undertaking these investigations the Reporter shall also review the issues arising (reported) from the IDBP and assess whether these have been satisfactorily resolved or explained in subsequent submissions.*

*The Reporter shall provide a general commentary (see below) and answer the specific questions detailed in relation to each CBS table, making it clear the main table(s) to which its answers refer. Where the same answer applies to more than one CBS table, it need not be repeated. However cross reference(s) to the CBS tables to which the commentary refers should be included in the commentary.*

### ***Questions on SW CBS submissions***

*The CBS is divided into blocks, and the Reporter should address the questions on each block shown in bold below. The remaining bulleted text provides further explanation and guidance. Where the answer to any of the questions is 'no', the Reporter should estimate the adjustment required to make the submitted standard costs compliant.*

#### ***Block 1 General information:***

*The Reporter shall:*

- Check SW's reference to standard practice documents/generic solutions or completed similar projects and confirm or otherwise whether the proposed solution is SW's normal practice. For example, is this the process design SW would typically choose?*
- For non-infrastructure, comment on the suitability of process choice. For example, comment on is it likely to work and on whether it is the least whole life cost solution where the process is appropriate to be used (the process might not always offer the least whole-life cost solution).*

#### ***Block 2a Direct costs:***

*The Reporter shall:*

- Confirm whether the cost data represents SW's typical costs.*
- Comment on the link between the data used in the cost base and that being used to develop the*

- *draft business plan.*
- *Where SW has not been able to extract direct costs from its cost capture system, examine and comment on SW's method for estimating these costs. The estimating method should be appropriate in detail for the scale of investment expected in SRC10-14; for minor investment, the quality of estimating may be less important.*

**Block 2b Adjustments and exclusions:**

*The Reporter shall:*

- *Confirm whether the items included, assumptions and methods are consistent with standard cost definition and table guidance.*
- *Confirm whether adjustments are typical or representative of actual costs;*
- *Check and confirm whether direct cost adjustments or exclusions have been derived in accordance with the methodology described in Section 3 and the specific guidance on each sub-service in Appendix Two;*
- *Comment on factors SW cannot control that affect costs, e.g. being limited to sub-optimal lengths for pipe/sewer laying. Are these material and do they mean that standard costs do not comply with the definitions?*

**Block 3 Indirect costs:**

*The Reporter shall:*

- *Confirm whether the indirect costs are representative of actual costs.*
- *Confirm whether comparable costs are being used to develop the draft business plan.*
- *Where SW has not been able to extract indirect costs from its cost capture system, examine and comment on SW's method for estimating these costs.*
- *Confirm whether SW has used a suitable averaging method (e.g. across water infrastructure or water non-infrastructure) for indirect costs such as asset management, design, supervision and commissioning costs.*
- *Check and confirm whether SW has not adjusted indirect costs based on the argument that the standard costs represent 'easy' projects.*
- *Where costs are based on tender data, confirm whether a tender to outturn adjustment factor has been applied, based on the average tender to outturn ratio.*
- *Where costs are based on outturn costs, confirm whether SW has allowed for the typical level of risk, e.g. by including an appropriate contingency allowance.*
- *Examine how risk allowances in standard costs align with risk allowances in business plan estimates.*

- *Confirm whether where applicable a pain/gain adjustment has been made at project and programme levels.*

**Block 4 Corporate overheads:**

*The Reporter shall:*

- *Confirm whether all corporate overheads been allocated and whether the same overheads are being used to develop the draft business plan.*
- *Verify and confirm whether percentage allowances for overheads in the standard costs include all capitalised overheads e.g. non-project staff, buildings, vehicles, etc.*
- *Check and confirm that SW has not reduced the percentage on the grounds that projects used to derive standard costs are 'straightforward'.*

**Block 5 Confidence grades - Reporter assessment:**

- *The Reporter should confirm the confidence grades provided by SW or, where they do not agree, submit his/her own assessments, referring to Table 2 in Appendix Two of the SW guidance.*

**General commentary in written report**

*The Reporter shall provide general commentary under the following headings:*

**Sources of data and methodology**

*The Reporter shall:*

- *Confirm or otherwise whether the data sources, unit cost data, estimating systems and procedures used to derive all standard costs are consistent with those being used for providing the capital expenditure estimates in developing SW's draft business plan.*
- *Verify and confirm whether SW has completed the CBS in line with the information requirements. Where SW's cost breakdown does not align with the CBS, check and confirm or otherwise whether SW has clearly explained where the costs are included.*
- *Verify and confirm whether SW has completed standard costs only for those categories that represent 2% or more of planned expenditure for the activity area (see Section 3). Where SW has not completed such a standard cost, confirm or otherwise whether the reasons given by SW for non completion are in line with the guidance in Section 3.*

**Special factors**

*Where SW claims that special factors affect the comparability of standard costs, the Reporter shall review these claims critically and comment on SW's answers to the questions under this heading in Section 3 of the guidance. SW itself should not make any adjustments to standard costs to reflect special factor claims; the Reporter shall check whether this is the case.*

### ***Independence of SW estimates***

*The Reporter shall:*

- *Confirm or otherwise that SW has compiled its standard cost submissions largely independently of other water and sewerage companies.*
- *Where there have been exchanges of technical information between companies on design and processes, identify whether amendments to standard costs are also reflected in the investment projections submitted by SW.*
- *Identify whether this transfer of information has resulted in lower unit costs assumptions in capital expenditure projections than would otherwise have been the case.*

### ***Comparison with 2004 standard cost estimates***

*The Reporter shall:*

- *Provide an assessment of the change in the level of standard cost estimates submitted in tables 9 and 10, and of the reasons given by SW for the differences between current estimates and those submitted in 2005.*
- *Confirm the extent to which SW has updated its costing methodology for unit costs to take account of technological and other efficiencies since SRC06-10.*
- *Where there are significant differences between unit costs for projects based on SRC06-10 guidance and similar unit costs for projects based on current guidance, comment on the reasons for the differences and whether there is any evidence of savings being made. Significant means an increase of at least 10% or a reduction of 10%.*

### ***Balance of workload***

*The Reporter should focus on those standard costs that represent a larger proportion of SW's capital programme and on those aspects of the methodology and those special factors that are the most material.*

*Reporters should balance their workload on the cost base report as follows:*

<i>Sources of data and methodology</i>	<i>60%</i>
<i>Special factors</i>	<i>15%</i>
<i>Independence of SW estimates</i>	<i>5%</i>
<i>Comparison with 2005 standard cost estimates</i>	<i>10%</i>

*Following SW and Reporter submissions, we expect to raise queries to test comparability with companies in England and Wales. This will require additional input from the Reporter, which should be allowed for in work planning.*

**ANNEX 2 - MEETINGS**

Date	Location	Personnel	Subject
26/11/08	B&V, Redhill	JBM	JBM01: Review of exclusions
01/12/08	SW, Watermark Ho., Livingston	GC, RP, JBM	JBM02: Introduction to the Cost Base
01/12/08	SW, Watermark Ho., Livingston	JBM	JBM03: Comparison of on-costs with 1DBP and reconciliation of on-costs with CBS
02/12/08	SW, Riverside, Dundee	CA, SD, SB, AMcD, JBM	JBM04: T8 Line 1 – 750m3 storage tank
02/12/08	SW, Riverside, Dundee	CA, SD, AMcD, JBM	JBM05: T8 Line 2 – 3000m3 storage tank
02/12/08	SW, Riverside, Dundee	CA, SD, AMcD, JBM	JBM06: T8 Line 3 – CSO
03/12/08	SW, Watermark Ho., Livingston	GC, GMcC, AC, MH, JBM	JBM07: T4 WTW standard costs
03/12/08	SW, Watermark Ho., Livingston	GC, JF, JBM	JBM08: Cost Base on-costs
04/12/08	SW, Watermark Ho., Livingston	GC, RP, SB, SD	JBM09: T4 WTW standard costs
10/12/08	SW, Watermark Ho., Livingston	NA, DA	DA01: Allocation of costs to tables 1, 3, 5 and 7
11/12/08	SW, Watermark Ho., Livingston	SB, SD, CF, DA	DA02: Items 4.13, 4.14, 8.4, 8.5, 8.6 & 8.7
10/12/08	SW, Riverside, Dundee	GD, SD, RP, AMcD, DMP	DMP/07: Cost base Table 4 Line 10 and Line 11 service reservoirs
11/12/08	SW, Watermark House, Livingston	GC, DMP	DMP/08: Cost base Table 2 water infrastructure
12/12/08	SW, Watermark House, Livingston	GC, DMP	DMP/09: Cost base Table 6 wastewater infrastructure
10/12/08	SW, Riverside, Dundee	GD, SD, RP, AMcD, DMP	DMP/07: Cost base Table 4 Line 10 and Line 11 service reservoirs
16/03/09 17/03/09	SW, Watermark Ho., Livingston	CA, GC, SD, AMcD RP, JBM	JBM/13: Amendments to for the final Cost Base
17/03/09	SW, Watermark Ho., Livingston	GC, SD, JBM	JBM/14: Water main rehabilitation by pipe insertion.

## Reporter's team

DA	David Arnell	Reporter
JBM	John Mills	Lead Auditor
DMP	David Prisk	Auditor

## Company and Supplier staff

NA	Norrie Adams	SR10 Capex Database Manager	Scottish Water
CA	Chris Ayres	Project Development Manager	Scottish Water Solutions
SB	Sandy Bennett	Mechanical Engineer	Scottish Water
AC	Alan Carter	Civils Estimator	MWH
GC	Grant Cooper	Cost Base Costing Manager	Scottish Water

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SD	Simon Dawson	Quantity Surveyor	Faithful & Gould
JF	John Faulke	Costing System Manager	Scottish Water
CF	Chris Francis	Regulation Team	Scottish Water
MH	Malcolm Hall	M&E Estimator	MWH
GMcC	Gordon McCombe	Water Process Engineer	Scottish Water Solutions
AMcD	Allan MacDonald	Electrical Engineer	Scottish Water
RP	Rachel Philp	Cost Base Manager	Scottish Water