

Ofwat

Advice on Capital Works Unit Costs (Cost Base)



**Ofwat
ADVICE ON CAPITAL WORKS UNIT COSTS
(COST BASE)**

July 2007

Contents

	Page
EXECUTIVE SUMMARY	6
1 INTRODUCTION	9
2 APPROACH	10
2.1 Introduction.....	10
2.2 Workshops.....	10
3 TASKS	11
3.1 Alignment of the Cost Base with contractual & procurement practices....	11
3.1.1 Introduction.....	11
3.1.2 Current Industry Practice.....	12
3.1.3 Questionnaire Review.....	15
3.1.4 Summary of findings.....	21
3.1.5 Conclusion.....	24
3.2 Review of Standard Cost description for different contractual arrangements.....	26
3.2.1 Introduction.....	26
3.2.2 Questionnaire Feedback.....	26
3.2.3 Competitive Tendering.....	27
3.2.4 Framework.....	28
3.2.5 Pain/Gain.....	30
3.2.6 Guidance.....	30
3.2.7 Stages.....	33
3.2.8 Generic Requirements / Approaches.....	33
3.2.9 Summary of findings.....	35
3.2.10 Conclusion.....	35
3.3 Review of Arup / EC Harris Report.....	37
3.3.1 Introduction.....	37
3.3.2 Assessment.....	35
3.3.3 Summary of findings.....	38
3.4 Review of Variance Analysis on Standard Costs.....	40
3.4.1 Introduction.....	40
3.4.2 Summary of findings.....	41
3.5 Review the minutes from the Company visits carried out by Ofwat.....	43
3.6 Horizontal audit of Standard Costs.....	47

Advice on Capital Works Unit Costs (Cost Base)

3.7	Review of stages/processes used by companies in the Standard Cost Calculation.....	49
3.8	Review of generic tests.....	55
3.9	Derivation of source data to build up the Standard Costs.....	59
4	DISCUSSION AND RECOMMENDATIONS.....	61

FIGURES

Figure 1	– Trend Line
Figure 2	– Percent of Capital Programme delivered through Frameworks
Figure 3a	– Percent of Design carried out In-House (Process)
Figure 3b	– Percent of Design carried out In-House (Civil)
Figure 3c	– Percent of Design carried out In-House (MEICA)
Figure 4	- Critical Comparable stage / process in Standard Cost Calculation

TABLES

Table 1	Company List
Table 2	Typical Price Build Up
Table 3	Common Systems adopted by Companies
Table 4	Questionnaire Summary Key Issues
Table 5	Comparison of Preparation of Standard Costs under Lump Sum and Target Cost Payment Mechanisms
Table 6	Data Collection & Analysis Process
Table 7	Key Findings
Table 8	Key Findings
Table 9	Generic Tests

Glossary of Terms

1. ADVERSARIAL	Potential for confrontation under a Form of Contract, e.g. additional costs / time.
2. ADD ON'S / ADJUSTMENT	Items to be added or subtracted from unit rates to determine the standard cost, e.g. unusual terrain, etc.
3. ALLIANCING	An arrangement between two or more parties where the project and business directions are aligned across the parties.
4. BOTTOM-UP:	Based on the summation of base costs, e.g. concrete, excavation, etc. up to the unit cost level, e.g. process treatment unit.
5. COLLABORATION:	Application of a compensation event culture to arrive at an equitable solution under a Form of Contract.
6. COMPETITIVE:	A procurement approach to deliver a single / series of projects at the lowest market available price.
7. COST +	A contract based on actual cost plus the profit and overhead percentages.
8. COST CURVE	Water Companies' graphs used to determine project Target Cost against base parameters, e.g. size or performance, typically used on Frameworks.
8. DESIGN AND CONSTRUCT	A contractual arrangement where a single entity is responsible for both the design and the construction of a project.
9. DIRECT COSTS:	Contractors costs which are incurred in carrying out the construction of the Works.
10. FIXED LUMP SUM:	An all inclusive fixed lump sum price bid against a performance specification.
11. FRAMEWORK:	A procurement arrangement to deliver a series of projects / programme of works under a collaborative Form of Contract.
12. INDIRECT COSTS:	Client or contractor's costs which are incurred in supporting the process of carrying out the construction of the Works.
13. JOINT AND SEVERAL:	A contractual / legal arrangement binding two or more parties into a single entity with shared liabilities and benefits.
14. ON-COSTS:	Costs which are incurred by the client or contractor in sustaining their business that are not attributable to the process of carrying out work (which are covered by direct and indirect costs).

Advice on Capital Works Unit Costs (Cost Base)

15. OPEN BOOK:	A pricing basis where both the client and the contractor have full visibility and ownership of the cost build-up.
16. OUT-TURN COST	The final cost of the project taking into account all additions (and deletions) to the actual cost incurred under the Contract throughout the life of the construction project.
17. OVERHEAD	Routine administrative and maintenance expenses of a business.
18. PAIN / GAIN SHARE:	An incentivisation mechanism for the client and contractor(s) to share pain and gain over a set band width having upper and lower limits.
19. SCHEDULE OF RATES:	A list of all inclusive unit rates, procured competitively, used to deliver a series of projects / programme of Works.
20. TARGET COST:	An activity based, open book, ceiling price incentivised with a Pain / Gain mechanism either specified in the tender documentation or by application of standardised cost/fee curves.
21. TOP DOWN:	Based on the summation of costs disaggregated down to a defined level, e.g. process treatment unit.

Executive Summary

Introduction

Cost Base is a tool used by Ofwat to assess relative efficiency in the procurement and delivery of capital programmes and is based on a comparison of costs for a range of standardised capital projects (known as standard costs) that conform to an outline specification.

Cost Base was developed prior to PR94 and applied at that review. It has been modified at each periodic review since then, the aim being to improve the accuracy and consistency of the capital expenditure efficiency challenge. Each company's standard costs are analysed and if they are high compared to its peers, this indicates scope for delivering the overall capital works programme for less than suggested by the company's investment plan.

The Cost Base process has been subject to both criticism from the industry and support from industry observers and an output from Ofwat's review of PR04 was a recommendation for review of the Cost Base methodology. In January 2007, Ofwat commissioned this study into the modifications that could be made to Cost Base to improve the assessment of relative efficiency.

The scope of the study principally incorporated the following activities:

- Investigation into how the production of standard costs is affected by the range of contract pricing and payment mechanisms; identify potential changes that would better align the Cost Base with industry current capital programme practices.
- A detailed audit of a selection of standard costs submitted at PR04 to provide an assessment of the proportion of the variance that clearly reflects differences in efficiency.
- Review how Cost Base guidance can be improved to minimise variance in standard costs through misinterpretation to facilitate better comparability.

This report documents the findings of the Study and incorporates a number of conclusions and recommendations which can be summarised as follows:

Discussion

Potential changes that would better align the Cost Base with industry current capital programme practices.

The present industry procurement processes cover a spectrum from project based competitive single tender to long term alliancing frameworks.

The application of a business system across an alliancing framework which incorporates a joint cost capture mechanism will typically allow the standard cost to be prepared to a higher level of confidence compared to those who develop standard costs by other means. Where the joint systems do not exist there would need to be special provision within the contract to expose unit costs. This is likely to take time to achieve as to retrospectively change existing

Advice on Capital Works Unit Costs (Cost Base)

procurement arrangements in areas of such commercial sensitivity will be impracticable.

Competitive procurement routes are typically lump sums offered. This makes disaggregation of the project costs difficult such that they are less readily aligned with the preparation of standard costs.

It is evident that better visibility of the build up of standard costs is the key to identifying reasons for variance across the industry. This will allow Ofwat to establish whether a joint cost capture system is essential for companies to produce compliant standard costs. A more rigidly defined process in place for the presentation and analysis of Cost Base submissions would expedite feedback to the Reporters who in turn would be better able to challenge the sources of variance if they are directed towards those elements.

Assessment of the proportion of variance that clearly reflects differences in efficiency

Standard costs examined in this study have highlighted a wide range of sources of actual and potential variance (which includes differences in efficiency). Because of the range of identifiable causal factors leading to variance the key recommendation is to require better visibility of the build up of costs and to introduce appropriate processes to identify and correct non-efficiency related variance quickly.

It is considered impractical at this stage for Ofwat to provide sufficiently tight Cost Base guidance (which is essentially a product specification process) to achieve consistency – there is too much variation in fundamentals such as procurement processes, assumptions made, volumes of work etc. The more effective way to identify non-efficiency related variance is to apply a quality control process to the elements that make up each standard cost (on costs, direct costs, site/regional factors etc). This should include investigation of outliers by the Reporters and ensuring there is transparency across the industry of the disaggregated build up of standard costs.

A rigid data entry process detailing the necessary disaggregated elements of the standard cost to be input by water companies would support the guidance provided and promote consistency to permit an effective horizontal audit of standard costs.

Recommendations

Improvements to the assessment process used to expose variance not related to efficiency.

Six key steps to improve the assessment process have been identified as follows:

- Improve the guidance provided in the Cost Base 'Information Requirements' as described above.

Advice on Capital Works Unit Costs (Cost Base)

- Improve the companies and Reporters understanding of the 'Information Requirements' by means of Workshops and open forum discussions, possibly one event for each party.
- Ensure that the Reporters carry out comprehensive audits and provide consistency of challenge with particular regard to the link between the standard costs and the unit costs/investment estimates.
- Incentivise the companies to develop and improve their cost data collection systems regardless of the types of contract or procurement processes utilised.
- Ensure the companies expose the build up of their standard costs in a consistent format.
- Increase the level of transparency as regards the make up of Cost Base submissions, with more detailed information in the public domain.

Improvements to guidance to minimise variance in standard costs

- Re-structure the 'Information Requirements' to provide a short front end description with diagrams illustrating the key elements of the process and emphasising the link between standard costs and investment estimates. The aim is to achieve a clear understanding of the aims and objectives before the development of the standard costs commences.
- Reduce the volume of text as far as practicable without losing essential guidance; remove any duplication of information or instructions.
- Consider removing the guidance to Reporter to a separate document.
- Correct ambiguities in the line descriptions in the existing Cost Base Information Requirements document.
- Remove the requirement to complete hard copy checklists – to be replaced by electronic spreadsheets.
- Reduce the number of standard costs items

The above proposals should be progressed to improve the robustness of the Cost Base methodology for application at the next review.

1 INTRODUCTION

Jacobs was commissioned by Ofwat in January 2007 to provide specialist advice on the modifications that could be made to the Cost Base guidance to improve the assessment of relative efficiency. The scope of the study was split into two main areas:

- Investigate how the production of standard costs is affected by the range of contract pricing and payment mechanisms likely to be used by the water industry, particularly those used in collaboration style or serial contracts. From this recommend any changes that would better align the Cost Base with industry current capital programme contractual, procurement and delivery practices. Identify the main contractual arrangements in place across the industry and provide recommended guidance for companies to follow to ensure the comparability of standard costs regardless of the chosen contractual/procurement route; and
- A detailed audit of a selection of standard costs submitted at PR04 to provide an assessment of the proportion of that variance that clearly reflects differences in efficiency. Based on this analysis recommend how the guidance could be improved to minimise the variance arising because of misinterpretation of the standard cost descriptions.

In order to meet the objectives outlined above a number of sub-tasks were identified. The tasks and main findings are outlined in the following sections.

2 APPROACH

2.1 Introduction

A number of specific tasks were identified as part of the Ofwat brief in order to fulfil the objectives. The report is structured around these tasks supported by discussion on our approach to each task together with the main findings.

2.2 Workshops

A workshop was held on Wednesday 28th February 2007 and notes from the group sessions are attached as Appendix A. Feedback and comments from the workshops are included in the task text where appropriate.

3 TASKS

3.1 Review the current Cost Base approach and provide an expert view about the alignment of the Cost Base principle with current industry contractual and procurement practices.

3.1.1 Introduction

Historically the approach to cost base has not taken specific account of the procurement approach adopted.

The primary focus of the Cost Base approach is to establish a series of specific standard costs which are comparable across the Water Companies. To provide confidence in the comparability, bespoke costs such as those associated with an atypical ground risk, archaeology, excess of services, etc. are excluded from standard cost descriptions. In this way the numbers of influencing factors which drive the standard cost are reduced to those reflected by company specific factors, i.e. local labour and material costs and local delivery efficiencies / skills in the contracting base, and the efficiencies of the Companies approach to design, management, risk assessment and overheads.

A range of percentage add-ons / adjustments are included in the standard cost build up which reflect the on-costs for the companies. A proportion of these on-costs are driven by the procurement mechanism adopted.

The build-up of the standard costs is audited by Company Reporters. The confidence level of the audit is a function of how the standard cost data is captured within the procurement mechanism adopted by a company and then translated into unit costs, standard costs and investment estimates.

To gain an understanding of the impact of the procurement mechanism adopted on the standard cost the eight companies listed below in Table 1 were the subject of a questionnaire based review of their procurement mechanisms. To provide a measure of their position in the water market they have been ranked based on the value of their capital programme.

Advice on Capital Works Unit Costs (Cost Base)

Company	Acronym	Rank	Investment Ratio
Water & Sewerage Company 1	WASC1	1	32
Water & Sewerage Company 2	WASC2	2	20
Water & Sewerage Company 3	WASC3	3	11
Water & Sewerage Company 4	WASC4	4	8
Water & Sewerage Company 5	WASC5	5	8
Water Only Company 1	WOC1	6	1
Water Only Company 2	WOC2	6	1
Water Only Company 3	WOC3	6	1

Table 1
Company List

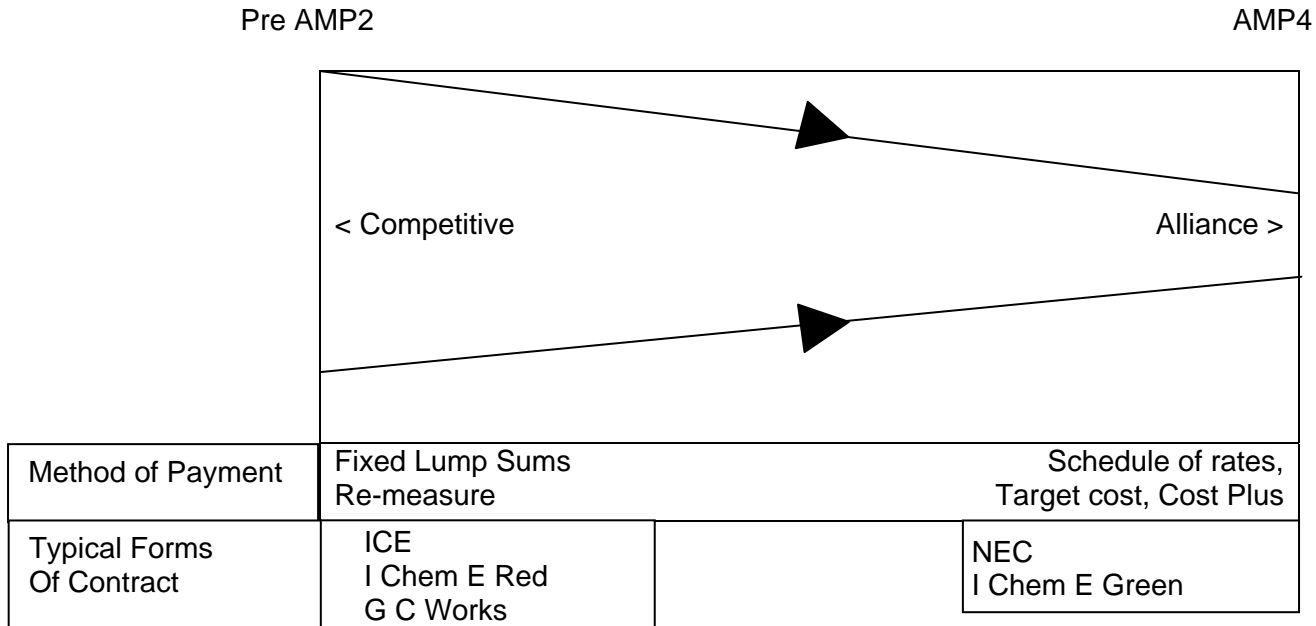
The Investment Ratio is a comparison of the size of a Company's capital programme in relation to the smallest capital programme. Companies WOC1, WOC2, WOC3 have sensibly identical investment levels whilst the largest, WASC1, has an investment programme of the order of 32 times larger.

The ratios can be taken as indicators of the pulling power and economies of scale which may be accessed by the individual Programmes. The size and nature of the programme also influences the procurement process, i.e., if the preponderance of the programme is infrastructure it is likely that a schedule of rates approach would be adopted.

3.1.2 Current Industry Practice

The contractual/procurement mechanisms currently in use across the water industry vary from a traditional approach utilising fixed lump sum competitive tendering to an alliancing approach incorporating joint and several integration of the delivery partners with risk share and common business systems. Indications are that there is an industry trend towards an alliancing approach which has in general been found to deliver efficiencies and savings across the full raft of programme delivery, i.e. in both management and delivery areas. Figure 1 below presents a schematic overview of the trend along the AMP2 to AMP4 timeline.

Advice on Capital Works Unit Costs (Cost Base)



Key: Industry Trend

Figure 1
Trend Line

The contractual arrangements have progressively developed over each of the Asset Management Plan periods under a strong drive to achieve efficiencies and cost savings. Over this timescale there have been inter-company meetings and discussions to share best practice experience, which have resulted in the delivery basis for frameworks for alliancing / collaborative working, being substantially common across those companies which have adopted this approach. However, competitive tendering with more traditional contracts have been retained to a greater or lesser extent by a number of companies with particular regard to the delivery of non-infrastructure assets.

Differing Forms of Contract are used but in general the work elements are priced against a schedule of activities or rates. The nature of the pricing process in the contract and the basis for pricing and payment will influence how the Form of Contract aligns with the process of producing standard costs. The established approach for testing the robustness of standard costs is the application of an Engineering Judgement Grade. Ofwat guidance on the reliability and accuracy of standard costs (minimum expected to be considered for use as the benchmark standard cost) states;

Reliability – company specific data should be used where standard cost is for work where the company has experience in its own region and can call on data from either a limited number of completed projects or detailed design estimates in a similar size band.

Advice on Capital Works Unit Costs (Cost Base)

Accuracy – within 20% to 30% where standard cost represents works where reasonable company specific data is available. Some source data may be from a non-company source. Company is less confident that all adjustments for site specific factors have been made accurately and as specified in the guidance.

In relation to contractual and procurement practices it is considered that a company's ability to meet the minimum requirement expected could be influenced by that company's ability to disaggregate the costs making up the price. The prices submitted by contractors will typically include; direct costs (possibly with price breakdowns), an allowance for risk, on cost, profit, and overheads. However, visibility of these individual contract cost items to the water company will typically depend on the Form of Contract (as well as the stipulated disclosures by the contractor to the Water Company).

Table 2 below lists the main aspects which make up the various bases for pricing / payment.

Advice on Capital Works Unit Costs (Cost Base)

Item	Cost	Tendering	Alliancing/ Frameworks	
		Fixed Lump Sum/Lump Sum	Schedule of Rates	Cost +/- Target Cost
Risk		Included	Included	Identified and Valued
Price Breakdown		Coarse	None	Detailed
On Costs		Limited Identification	Included	Identified
Profit		Included	Included	Identified
Overheads		Limited Identification	Included	Identified

Table 2
Typical Basis for Pricing

From inspection of Table 2 one can draw the conclusion that in terms of providing access to the data required to build up a compliant standard cost (as specified in the definitions of Engineering Judgement Grades), the Cost +/- Target Cost price bases have the advantage.

3.1.3 Questionnaire Review

To provide an understanding of each company's procurement process an electronic questionnaire was issued to the identified eight companies. The questionnaire summary is reproduced in Appendix B and key areas of the questionnaires have been identified and reviewed under the following three headings.

- **Framework delivery:** As stated there is an acknowledged trend towards an alliancing approach to delivery within a framework. The questionnaire allows an assessment to be made on the degree of the trend.
- **Joint / Common Systems:** These systems are both owned, populated and used by all parties to a contract. Use of such systems are indicative of the level of alliancing / open book adopted.
- **Design Risk:** A company's approach to design risk can be used as a measure of their overall approach to risk and can influence the procurement route selected, e.g. shared risk (alliancing) passed risk (design and construct).

Advice on Capital Works Unit Costs (Cost Base)

From the consideration of these three heads a conclusion can be drawn on where each company sits on the spectrum from traditional to alliancing. In turn the position will generally reflect on the level of disaggregation of prices / costs for completing the standard costs.

1. Framework delivery

The procurement mechanisms vary from the 100% competitive approach adopted by WASC4, to the Alliancing approach adopted by WASC2. Between these two extremes there are blended strategies across both the non-infrastructure and infrastructure areas.

Figure 2 below demonstrates this variability in terms of the percentage of the Capital Programme delivered through Alliancing Frameworks.

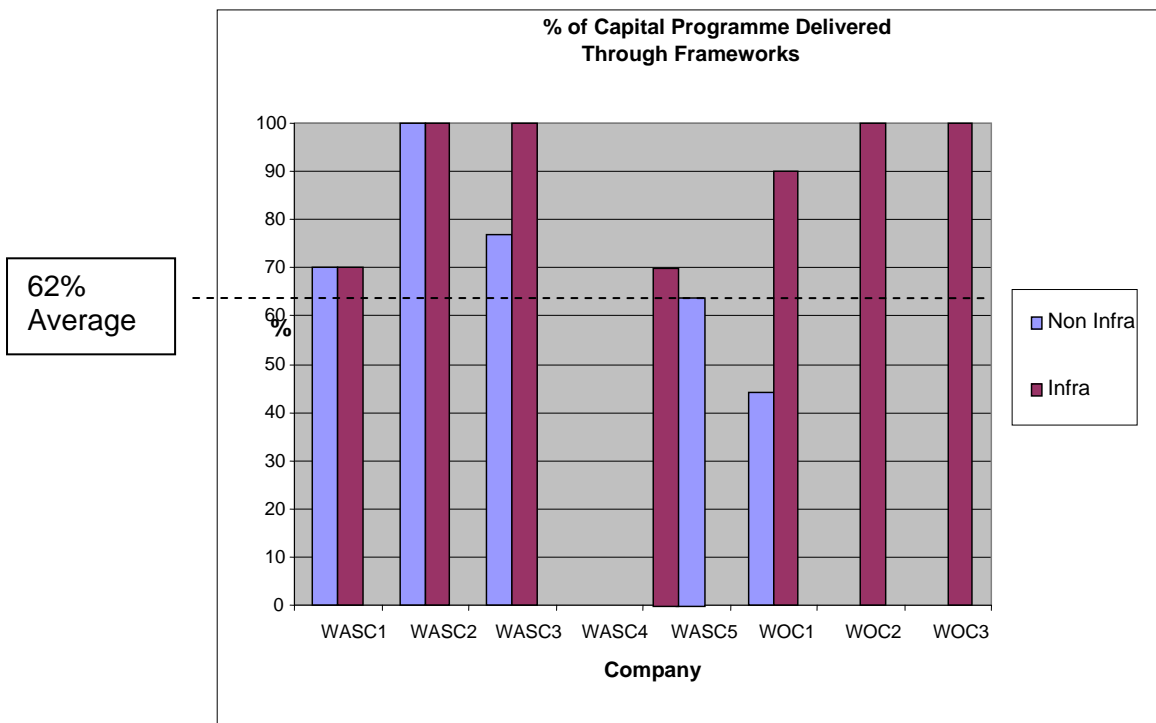


Figure 2

WASC2 deliver 100% of both their infrastructure and non-infrastructure programme through an Alliancing Framework

WASC3 deliver 100% of their infrastructure programme and 77% of their non-infrastructure programme through an Alliancing Framework. The 23% delivered competitively usually comprise the more complex non-infrastructure projects and this method is also used to benchmark the target cost approach adopted under their Frameworks. An element of Alliancing is carried out post-award on competitively bid projects.

With respect to the Water Only Companies the bulk of their programme is in the infrastructure sector, where Alliancing with a schedule of rates is

Advice on Capital Works Unit Costs (Cost Base)

adopted. With the exception of WOC1, all non-infrastructure work is procured competitively.

Discussion

Taking the eight questionnaires returned as typical across all of the companies Alliancing is the more common basis of the procurement process. The cross sample average is that 62% of programme delivery is through Frameworks. Of the eight respondees, three (two Framework and one Competitive) stated that the AMP4 programme delivery arrangements would be carried into AMP5. Five were undecided.

The sensitivity of Cost Base outputs (in terms of availability of data) to the contract approach is considered to be more significant on non-infrastructure projects. This is because on infrastructure projects, there is a relatively large sample of similar projects compared to non-infrastructure projects which tend to be more varied in specification, scale etc. and fewer in number. It follows that for infrastructure standard costs the water companies are more likely to be able to produce the standard costs that meet the minimum required Engineering Judgement Grades.

2. Joint/Common Systems

A key issue to alignment with the Cost Base principle is the adoption of common business systems between the companies and the delivery partners or delivery contractors. These systems will allow a Company to manage the data capture to a level of detail required by their internal business management systems and, ideally, the requirements of Cost Base. Table 3 below provides a summary of the questionnaire responses in this area.

Advice on Capital Works Unit Costs (Cost Base)

Common System Applications	Company Responses							
	WASC1	WASC2	WASC3	WASC4	WASC5	WOC1	WOC2	WOC3
Document Management	✓N		✓					
Reporting	✓N		✓				✓I	
Cost Capture database	✓N		✓				✓I	
Timesheets	✓N		✓					
Management Board	✓	✓	✓				✓I	
Noticing							✓I	
Health & Safety							✓I	
Co-location	✓I	✓	✓	X	✓	✓	✓I	✓I

Table 3
Common Systems adopted by Companies

Key

- ✓ : Positive response, infra & non-infra unless otherwise indicated
- N : Non Infra only
- I : Infra only
- ☐ : No response
- X : Negative

WASC1 and **WOC2** practice partial joint cost capture and **WASC3** has a full joint cost capture database approach. This sits comfortably with their overall Alliancing approach to programme delivery.

WASC2 practice a 100% Alliancing approach to programme delivery but have no joint cost capture database. They utilise the AIMS estimating package which is populated by the WASC2 Project Manager utilising out-turn costs.

The remaining companies in the sample did not indicate that they operated common business systems. Further investigation would be required to confirm whether these companies identify unit costs.

Discussion

A number of companies use estimating packages for cost capture which they populate themselves, i.e. the Company Project Manager will take the out-turn project costs, disaggregate them to some company defined level and insert them into the cost capture package. The degree of disaggregation affects the robustness of the standard cost build up.

Advice on Capital Works Unit Costs (Cost Base)

With respect to the three companies practicing partial or full, joint cost capture with their delivery partners, the degree of disaggregation is greater, i.e. the delivery partners use the data for setting target costs and therefore a greater degree of disaggregation is essential. Invariably the disaggregation applies to actual costs including contractors' cost. Some direct and indirect costs may not be recorded such as project level and programme level management costs for the company.

For each standard cost being built up, the number of on cost items included will vary according to the nature of the standard cost work specification. Interrogation of a sub sample of the main sample, of the response to this section of the questionnaire will provide a better understanding of how the Ofwat definition of on cost and the cost capture mechanism aligns. From this understanding a set of on cost guidelines could be generated for the companies which will in turn reduce inconsistency in the specific area of standard cost on costs.

3. Design Services

The amount of design work carried out in-house by the companies can be taken as an indicator of their approach to design risk, though it can also relate to whether a company sees design as a core business activity. This can influence the choice of procurement processes and hence the client's ability to see the detail of unit costs. Figures 3a, b & c below compare the percentage of design carried out in-house for each of the process / civil / MEICA work areas.

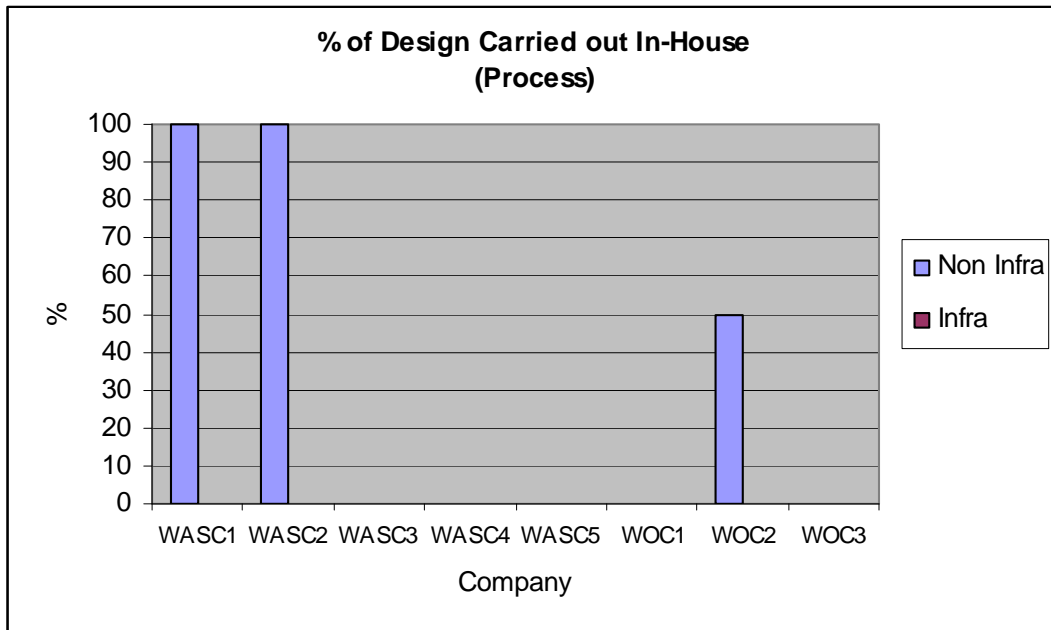


Figure 3a

Advice on Capital Works Unit Costs (Cost Base)

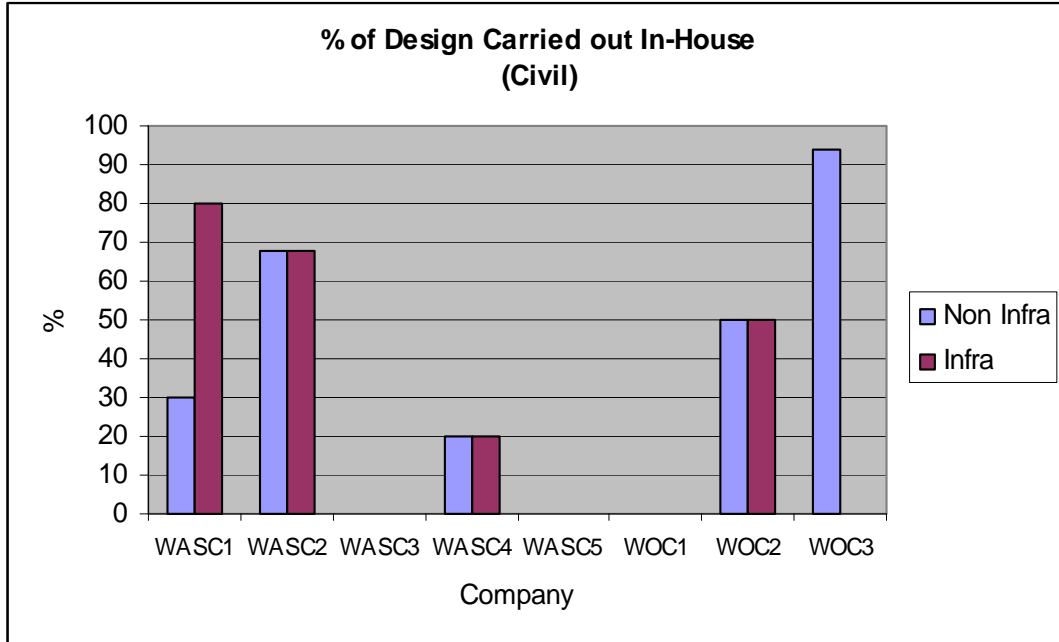


Figure 3b

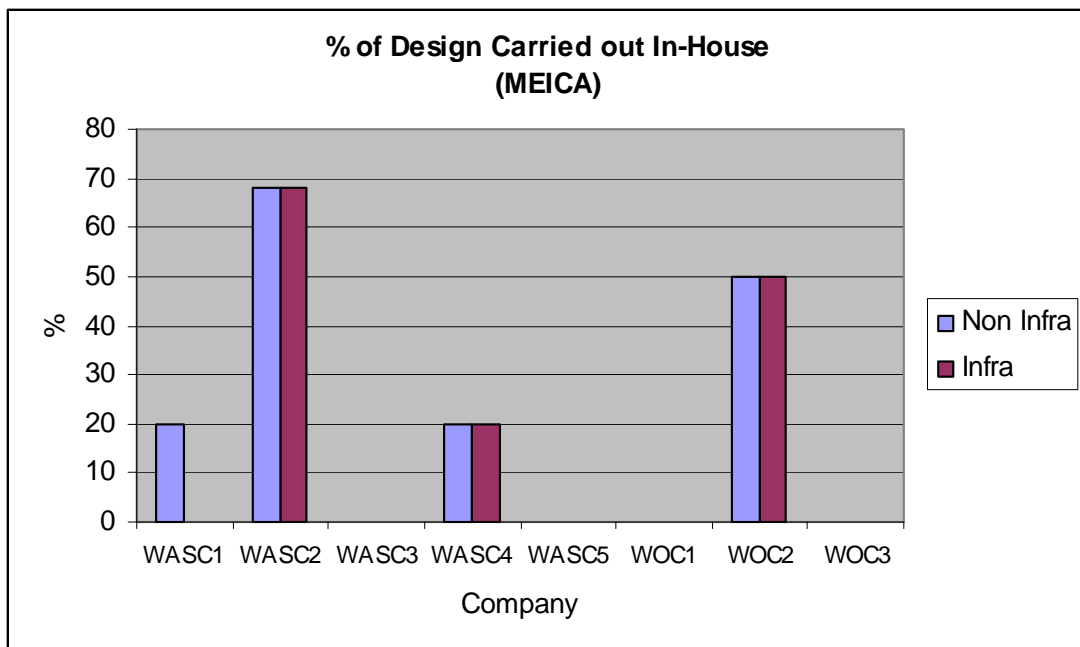


Figure 3c

Advice on Capital Works Unit Costs (Cost Base)

The feedback on design is summarised as follows on a company specific basis:

WASC1. This company carries 100% of the process risk in their procurement model and therefore carry out 100% of the process design, specifying the specifics of the process. For infrastructure projects 80% of the civil design is carried out in-house. In general a high percentage of this design work relates to third party issues, i.e. land owners, pressure groups, NRSWA noticing, SSI and SSSIs, etc, which require informed management. WASC1 believe that they are best positioned to provide this approach with a focus on the public relations aspect. **WASC2** adopt a similar approach.

WASC3. All design work/risk sits with their Alliance partners and the designers are joint and severally bound with the Framework contractors. This is the only company in the sample reviewed to have integrated their designers with their Framework contractors. The designer carries 100% of the design risk.

WASC4. Construction management is carried out in-house, with supply chain providing the design and construction services. This applies to both non-infrastructure and infrastructure.

WASC5 and **WOC1** adopt a full outsourcing to design services whilst **WOC3** retain only infrastructure design in-house.

WOC2 retain 50% of all design in-house and therefore retain a measure of control on the design outputs.

Discussion

The amount and type of design work carried out is driven by the business risks perceived by the company. Where a company considers that those work areas where either failure (process) or public interface (infrastructure) could impact negatively on the company image (share price) then the percentage of design work carried out in-house tends to be higher. The exception is WASC3 who impose a high management influence on the outsourced design process to achieve the same end result. However the information returned by water companies does not indicate that the client's control of design, especially process design, is a good indicator of the degree of alliancing nor the visibility of unit costs. The overriding issue appears to be the nature of the contract with respect to visibility of cost data.

3.1.4 Summary of findings

Table 4 brings together the key issues from Figures 1 and 2, plus Table 3.

Advice on Capital Works Unit Costs (Cost Base)

Company	WASC1		WASC2		WASC3		WASC4		WASC5		WOC1		WOC2		WOC3	
Delivery Base																
Framework %	70	70	100	100	77	100			70	66	44	90		100		100
Competitive %	30	30			23		100	100	30	34	56	10	100		100	
Risks Managed jointly with Contractor	✓		-		✓		-		-		✓		✓		-	
In-house design %																
Process	100	-	100	-	-	-	20	20	-	-	-	-	50	-	-	-
Civil	30	80	68	68	-	-	20	20	-	-	-	-	50	50	-	95
MEICA	20	-	68	68	-	-	20	20	-	-	-	-	50	50	-	-
Framework Period 5-10 years	✓		-		-		-		✓		-		-		-	
Staff Co-location	✓		✓		✓		X		✓		✓				✓	
Common business Systems	✓	✓	-	-	✓	✓	-	-	-	--	-	-	-	✓	-	✓
Joint Cost Capture database	✓	-	-	-	✓	✓	-	-	-	-	-	-	-	✓	-	-
No change in AMP5 Strategy	-		✓		✓		✓		✓		-		-		-	

Table 4
Questionnaire Summary
Key Issues

Key

Non Infra	Infra
-----------	-------

✓ Yes

- No Response

X Neagative

Advice on Capital Works Unit Costs (Cost Base)

From a consideration of Table 4 it is possible to conclude:

- **WASC3**, have common business systems which are designed to maximise integration and outsourcing to Framework Partners. Significantly the joint cost capture database has been developed from AMP2 through to AMP4 and captures the contractors' on-costs and actual costs down to process unit level. This method of disaggregation is likely to have developed because fee/cost curves (also to process unit level) are used to develop target costs hence the information provides a valuable means of measuring the validity of fee/cost curves as well as providing substantive data for Cost Base. It follows that the Framework approach can influence the way that companies find it useful to capture data. The high financial cost and culture change cost of developing common business systems has been incurred and effectively written off in previous AMPs.
- The current practice for pricing is based on activities, schedule of rates, or lumps sums. The traditional Bill of Quantities where prices are broken down to "labour and material" all in items, e.g. shuttering, C30 concrete, etc. is no longer practiced. By interrogation, **WASC3** process unit level prices can be broken down further e.g. piled foundations, concrete slab and walls, etc. In practice process unit level prices, together with disaggregation of costs, represents a sensible level of disaggregation in relation to complying with the standard costs.
- **WASC4** have adopted competitive tendering with common systems as required as they manage each contract in isolation. As a consequence their business-wide joint cost capture system is produced by bringing together discrete sets of project specific information. The ability to consistently exclude costs to comply with the standard cost specification may be affected. This approach is open to wide cost variations and volatile market conditions, i.e. market workload levels.
- With respect to the Water Only Companies there has been a movement towards an element of Alliancing in association with a blend of Framework and competitive tendering. However the cost capture of the on-cost aspect is only apparent in the Infrastructure area and will be based on a schedule of rates, which represents a typical pricing base for this type of work.
- Five companies from the sample do not operate joint cost capture databases, two operate partial joint capture and one operates full joint capture. With these companies, data for building up the standard cost is either drawn from standard packages (e.g. AIMS, ICEMATE, SAP) which the companies populate themselves, or data is used from historic projects / schedules of rates. The packages were primarily designed by software houses for use by contractors for estimating purposes. Their use for cost data capture (storage) is an extension of their originally designed purpose.

A view can be formed that the current procurement processes in practice across the industry for all Forms of Contract used, are focussed on actual cost reduction to maximise the difference between the approved Business Plan and the investment made. This is often achieved through

Advice on Capital Works Unit Costs (Cost Base)

incentivisation in Alliance arrangements and through maximising innovation and technology specialisms in competitive tenders. Companies are likely to adopt procurement practices that they feel will enable them to maximise efficiency. They are incentivised to do this, and in some cases these incentives are transferred to, or passed down to and shared with, the supply chain. These factors influence the form of procurement adopted.

Other factors likely to influence the procurement approach selected are:

- 1 The experience of a Company management team and / or the lack of a position in the market, (economy of scale), can militate in favour of an adversarial procurement approach, militating against the adoption of common systems.
- 2 The cultural and business ethos of the ultimate owner. The increasing offshore/venture capitalist interest in the companies as blue chip, low risk, and low return investments may result in potential further divergence of the procurement processes.

3.1.5 Conclusion:

From consideration of the questionnaire responses and taking account of industry knowledge, it is considered that the application of a common business system across a Framework which incorporates a joint cost capture mechanism will allow the standard cost to be prepared to a higher level of confidence compared to those who develop standard costs by other means. Where the joint systems do not exist there needs to be special provision within the contract to expose unit costs, and where this has not happened the client has to make an engineering judgement regarding the disaggregation. This situation could impact on the allocated EJG in the Cost Base.

The various databases in use across the industry contain actual cost data with different levels of disaggregation with respect to the associated company and contractor other costs, e.g. risk, overhead etc. Even though the actual costs are built up in differing ways with varying levels of disaggregation, the application of a database approach is considered to be beneficial in providing auditable and substantiated costs.

It is concluded that there is significant scope for improving the alignment between the contractual / procurement processes and the standard cost principle, in the areas of joint cost capture and application of on-costs (direct and indirect). It follows that the low uptake of integrated delivery alliancing may be a factor in the difficulty faced by the majority of companies in aligning their contractual/procurement processes with the standard cost principle. Companies could improve this situation by specifying the necessary level of disaggregation when preparing the pricing document at the project bid stage or as a requirement of the broader Framework bidding stage.

Typically, failure to achieve the correct level of disaggregation of a project out-turn cost will result in programme level and project level management costs and on-costs associated with bespoke project difficulties being applied to standard costs. This will add to the variations experienced across the Company standard costs. To provide adequate information for an understanding of each company's assumptions to be gained it is recommended that the ratios between standard and non-standard costs are

Advice on Capital Works Unit Costs (Cost Base)

given for both direct and in-direct costs and on-costs. The specification of a data input process to ensure that disaggregated data is submitted in a consistent manner is discussed further in Section 3.8.

Advice on Capital Works Unit Costs (Cost Base)

- 3.2 Identify, for different contractual arrangements, the stages that companies must demonstrate have been followed to ensure compliance with the standard cost description. This will include guidance on issues such as treatment of pain/ gain share, overheads, and risk. Investigate whether a single generic approach is valid, or whether separate approaches to differing contractual arrangements are feasible.**

3.2.1 Introduction

As demonstrated in Section 3.1.2, Figure 1, the contractual arrangements have developed over the AMP periods under a strong drive to achieve efficiencies and cost savings with a trend towards Framework based delivery mechanisms. Over this period there have been inter company meetings and discussions to share best practice which has resulted in a substantially common delivery basis for Frameworks. There are outliers such as WASC4 who adopt a contract management approach with competitive tendering.

Differing Forms of Contract are used but in general the work elements are priced against a Schedule of Activities. The nature of the pricing process, i.e. target cost, lump sum, etc., and the price basis, i.e. activities, schedule of rates, etc., will influence how the areas identified in this question can be managed.

3.2.2 Questionnaire Feedback

The opportunity was given in the procurement questionnaire for each company to comment on the difficulties that they experience in the completion of the standard costs which result from the procurement and contractual approach they adopted for delivering their AMP 4 programme.

Areas of difficulty as fed back by the companies are as follows:

- Risk Share: The risk cost and frequency is not readily available, or in a form, which can be applied to the standard costs.
- Contractors' Actual Site Cost: Only recorded at site level not at process unit level.
- Degree of detail of standard cost specification.
- An implied necessity for having previously carried out a project incorporating the standard cost work specification.
- Risk/Overhead Share: Difficult to estimate the level of project risk and overheads associated with Programme delivery.
- The inability to disaggregate costs: Site specific costs, Programme Management costs, innovative solution costs, etc.
- Economies of scale, volatile material costs and the use of all inclusive Framework rates.
- Framework schedule of rates.

Advice on Capital Works Unit Costs (Cost Base)

The difficulties reported are wide ranging and vary in nature across the companies but all revolve around data capture and the level of disaggregation.

From a consideration of the feedback there are four common areas of difficulty which have synergy with the areas identified in the question.

1. Risk
2. Indirect Costs
3. On-costs (some of which maybe embedded within indirect costs e.g. design costs if the design is being done by the contractor or overheads on stores if the contractor is providing and storing all plant and materials)
4. Company Overheads

Across the industry there are a number of Forms of Contract used but essentially there are two procurement arrangements, namely competitive tendering and Frameworks. Taking each in turn;

3.2.3 Competitive Tendering

This is the traditional procurement process where the price is typically a fixed lump sum generally using the I Chem E Red Book or G C Works suite of conditions. The price is against an outline concept design sometimes including performance specification and the construction, design and process risk rests with the Contractor.

A considerable amount of at-risk work, (e.g. tendering costs are borne by the Tenderer), is carried out up front by the Tenderer to ensure that the design as offered meets the specification and the performance guarantees. There may not be an obligation on the Tenderer to provide a detailed breakdown of his fixed lump sum.

1. Risk: The Contracts are normally led by a Principal Contractor who is supported by a supply chain. By its nature, the fixed lump sum will contain an element of risk monies which will be driven by the size and type of risk. It is normal for the risks to be passed down the supply chain which can make it difficult to disaggregate the risk monies.
2. Indirect Costs: These may include design, supervision, commissioning, health & safety, environmental and traffic management.

Normal commercial advantage is often taken by Tenderer to front end load the cost of the work activities. Whilst indirect costs can be included for overhead, site supervision etc., because of the coarse nature of the priced breakdown, the prices for each item may not accurately reflect the true cost. The Tenderer may price these items with a view to obtaining advanced cash flow, e.g. cost of installing site accommodation. Hence manipulation of the priced items to disaggregate and derive standard costs will be unreliable.

Advice on Capital Works Unit Costs (Cost Base)

3. On-costs and Company Overheads: These can be treated together as both are likely to be included as a common factor across all of the priced items in a fixed lump sum. On-costs would be assessed on a project specific basis while company overheads would be applied as a common factor to all projects. Both of these additions will be combined with commercially sensitive and time varying factors such as profit and it is therefore envisaged that these factors would be difficult to isolate and identify. A further complication is the fact that the link to the specific items in the schedule of activities would not be readily determined without detailed post-project analysis. It follows that linkage to the standard costs (which will typically be subsets of the items in the schedule of activities) will be even more difficult to establish.

Discussion

As outlined above there is normally no driver for the Contractor to provide a detailed and accurate breakdown of the fixed lump sum. It follows that the tenderer will be more likely to give accurate data if they have an incentive to do so. This is very hard to achieve and is the main reason why clients adopt the integrated, open book type of approach.

Conclusion

It will be difficult for a standard cost prepared from fixed price competitive tendering to fully comply with the standard cost specification and this will be reflected in the accuracy of the data. Whether it is meaningful for Water Companies to state that the accuracy of their subjective judgements meet Ofwat requirements (i.e. a '4' band in the Engineering Judgement Grades) is questionable.

3.2.4 Framework

This is a collaborative procurement process typically based on the NEC suite of Contracts. It is often based on a Target Cost (Target Cost) approach to contract pricing utilising an open book with the Company but may in some cases (such as a supply only contract) be based on a schedule of rates or cost plus a fixed multiplier.

A high level of upfront design is carried out to allow the Target Cost to have the appropriate degree of confidence. These costs are recovered through the Target Cost against an appropriate activity. Pricing is carried out against a detailed activity schedule.

1. **Risk:** A shared approach is adopted to risk where risk allocation is on an "he who is best able to" basis. A risk schedule is established with both values and ownership set against each risk identified. The schedule is re-visited throughout the life of the project and those risks "timed out" are removed from the schedule. In this way only realised project risks will move into the out-turn cost. They can be tagged for appropriate standard cost activities and, importantly, it is clear where these costs have been placed in the price schedule. This allows greater confidence in pricing any changes in work scope that might arise.

Advice on Capital Works Unit Costs (Cost Base)

2. **Indirect Costs:** The open book approach allows items such as indirect costs to be valued and interrogated prior to agreeing the Target Cost. This allows costs associated with design, commissioning, etc to be appropriately identified. It is clear where these costs have been placed in the price schedule and the activities associated with these costs may be undertaken by separate elements of an integrated team. This allows greater confidence in pricing any changes in the work scope that might arise.

This approach gives a high level of clarity on the overhead level attracted by the stylised standard cost.

3. **On Costs:** on an alliancing framework water companies will typically have cost curves for standard types of work. These curves will be empirical i.e. based on costs from completed projects hence provide a reasonable basis for extracting cost data for production of standard costs. However there is not normally visibility of the contractor's actual costs in carrying out the work and it is expected that under a large framework there will be projects where the contractor does well commercially and others where a loss is made. These may not necessarily be fully reconciled in a pain/gain mechanism. It follows that a water company may be more likely to use their cost curve data as the basis for standard cost production and while this does not necessarily show the most recent costs incurred it does provide a reasonable basis.
4. **Company Overheads:** The contractor's company overheads will have been identified during the framework tender process. There is however a danger that a contractor may adapt this figure slightly depending on the prevailing commercial conditions at the time of tender. However compared to a fixed lump sum contract, visibility of company overheads will be greater. The water company's overheads would be apportioned top down and applied to the CAPEX / OPEX programmes.

Discussion

The entire approach to Target Cost build up lends itself to disaggregation of risk, on cost, overhead, etc. Not only can it be disaggregated but it can be interrogated. The concept of a joint capture database sits comfortably in this contractual form. The type of disaggregation needed varies with the end purpose. Clients, with an eye on Cost Base and performance measures, are likely to be interested in process unit or process performance, whereas contractors are interested in construction operations. The collaborative approach facilitates this type of flexibility. The concept of a joint capture database sits comfortably in this contract form.

Conclusion

There tends to be a greater degree of compliance with the standard cost specification using costs developed from Framework arrangements. This is considered to be due to the increased transparency between Company and Contractor and also because the information related to on-costs, risk etc can

Advice on Capital Works Unit Costs (Cost Base)

be derived with reference to all projects under the Framework rather than on a project by project basis as is the case on a competitive tender.

3.2.5 Pain / Gain

Incentivisation is not strictly applicable to fixed lump sum contracts unless an unrelated issue is applied to the contract post award, e.g. time is of the essence. With respect to Collaborative type contracts the general practice is to use incentivisation.

The Pain / Gain mechanism is normally specified in the tender document within a banded structure. Typically >85% Gain share < 100%; 100% < Pain share < 110% and > 110% Pain.

Within Frameworks it is normal to apply Pain / Gain at project level AND programme level assessed annually, or, at the end of the AMP. Regardless of the timing of the Pain / Gain reconciliation, the company is able to pursue efficiency savings throughout the life of a Framework.

3.2.6 Guidance

The adjustments made to project costs in order to develop rigorous, compliant and most importantly consistent standard costs are considered to have been an area where there has in the past been inconsistency of approach by water companies. This in turn may be a source of variance that is not related to efficiency. In order to make this process more consistent the key stages namely;

1. Identification of direct costs
2. Identification of indirect costs
3. On-costs
4. Water company overheads.

are considered in turn taking account of the two principle procurement processes (fixed lump sum and framework).

Guidance on the adjustments required at each of the four key stages in the build up of compliant standard costs is provided in the following table.

Advice on Capital Works Unit Costs (Cost Base)

Stage in building up standard cost	Guidance for making necessary adjustments
Direct Costs	<p>Where cost capture databases are aligned, confirmation of tender to out-turn differences and specifically of the allocation of risk monies will provide robust data for direct costs. This will typically only be achievable where the framework type procurement approach is used and cost capture processes are in place.</p> <p>Where cost capture databases are not in place, then a bottom up review of direct costs should be undertaken on as large a sample of projects as is practicable (considering the size of the water company's programme). This will involve disclosure by the contractor(s) and there may need to be incentivisation to make this happen. While it is recognised that barriers such as commercial confidences and commercial advantage may impede this process, it is considered key to establishing comparative efficiency that this data is obtained.</p> <p>The standard cost approach generally lends itself to the identification of specific direct costs because the items themselves are typically discrete elements of a project.</p> <p>The database input approach to collection of cost base data (discussed in Section 3.8) includes a description of the solution adopted by the water company. This supports the horizontal audit of direct costs for specific solutions used to build up a standard cost.</p> <p>Where direct costs cannot be obtained because the procurement approach does not provide visibility then water companies should be encouraged to develop a means of gaining this cost information from their supply chain (through negotiation / incentives) rather than using standard industry cost indices.</p>
Indirect Costs	<p>Similarly to direct costs, it is considered that indirect costs can effectively be attributed to the standardised costs. Where a water company has a significant programme of work it is to be expected that there will be reference projects where problems were not encountered and these provide a valid means of apportioning standard costs.</p> <p>Where smaller programmes of work mean that an ideal project cannot be identified then a reasoned approach should be employed to adjust actual indirect costs so that they comply with the standard cost specification.</p> <p>A formulae specifying the approach where the overall project direct cost is known and the item specific cost is not may take the form;</p> $\text{Attributable indirect cost} = \text{out-turn indirect cost of item} \times \frac{\text{direct cost of standard item}}{\text{actual direct cost}}$

Advice on Capital Works Unit Costs (Cost Base)

	<p>i.e. the indirect costs will be proportional to the direct costs attributable to the standard cost.</p>
On-Costs	<p>These can typically be attributed to a specific project using a top down approach i.e. from programme level to project level.</p> <p>However, it is envisaged that water companies will be able to identify on-costs for groups of work (for example; water infra, water non-infra, sewerage infra and sewerage non-infra) because these are commonly the divisions that companies are structured under and costs are monitored accordingly.</p> <p>Provided that the specific adjustment factors are given for each of the four divisions there is not considered to be a benefit in further project specific adjustment. This is because it is more important that this stage can be understood and compared with other water companies (and if necessary challenged by the Reporter) than adjusted on an item by item basis using a wide range of factors that may increase item specific accuracy.</p>
Water Company Overheads	<p>These should be applied to reflect the efficiency of the high level business processes. Adjustments to take account of project specific non-standard costs do not appear to be robust because it would be impracticable to specify a process that will enable water companies to consistently calculate the link between non-standard costs arising on site and the knock-on effect on the company overhead.</p> <p>It follows that the single company factor applied to all costs would provide a comparable measure of overall efficiency.</p> <p>The company overhead factor used should be stated on the returns and outliers may need to be challenged by the Reporter.</p>

The key to developing increased confidence in the standard cost is the disaggregation of the elements of Risk, Overhead and Pain / Gain. This is best dealt with at project level with the contracting partner / deliverer being required to price specific items to cover these activities supported by specific breakdown. For fixed lump sum projects this may be difficult to enforce under the Form of Contract. Disaggregation is the best way of producing a reliable database of unit costs necessary for the manipulations required not only to produce standard costs but also the capex estimates for future projects in the manner required by the Ofwat business plan requirements.

To obtain a view on the veracity of the money allocations placed against such items it is important that the figures are interrogated prior to acceptance of the tendered / target price. This is likely to be difficult to achieve for a fixed lump sum particularly bearing in mind the commercial advantage aspect outlined in Section 3.2.3 point ii).

3.2.7 Stages

Regardless of the contractual arrangement the stages to demonstrate compliance with the standard cost descriptions are the same. Equally, the guidance, presented under each stage below, is the same but for the reasons outlined in Section 2.3.6, may be difficult to achieve for a fixed lump sum competitive tender approach.

The key requirement, whether via an activity based schedule or a data capture process within a common business system arrangement, is that the costs are captured against the appropriate headings. Apart from the headings of direct and indirect costs there are the additional site specific items which must be identified and costed for adjustment purposes.

Using the data collected, and applying it at the appropriate stages of the delivery life of a project, the standard cost data can be refined. To take this approach forward the following three (3) stages have been identified.

Stage 1. Tender

Identify the following:

- Activities so they align with standard cost descriptions and are categorised.
- Site specific specialised work activities.
- Related time based activities, e.g. site supervision
- Quantify and prepare an activity specific risk table.
- Design costs.
- Profit.

Stage 2. Contract Completion

By examination of the risk table it is possible to identify those risks realised and those avoided or not incurred, so that they can be valued and placed against the relevant work activity. This may allow those risks attributable to the standard cost to be identified.

Stage 3. At Out-Turn

During the agreement of the Final Account the Pain / Gain status will be established and the incentivisation calculation carried out. By consideration of the construction programme against the activities to completion, areas of Pain / Gain can be identified and attributed to particular activities. Hence where appropriate they can be aligned with the standard cost.

This exercise will require the focussed and specialist skills of a Cost Engineer.

3.2.8 Generic Requirements / Approaches

With reference to the generic stages for preparing standard costs identified in Section 3.7 the problems that may typically be faced by companies for each stage are summarised in the following table;

Advice on Capital Works Unit Costs (Cost Base)

Generic stages	Payment mechanism	
	Lump sum	Target cost
Identify relevant cost data from past projects	<p>The historic data may or may not have been entered into a database. Entries will be subjective and their accuracy will depend on the Project Manager responsible for the breakdown.</p> <p>There will be situations where no lump sum project has been carried out which is similar to the particular standard cost. This will result in the SC build up being subjective. Under such circumstances a standard cost should not be submitted.</p>	<p>By their nature Target Costs will historically have similarity across project activity schedules, i.e. breakdown.</p> <p>Even if a similar project to the standard cost has not been carried out, the detailed build up of the standard cost can be based on the activity based breakdown.</p>
Disaggregation of costs into construction costs etc.	<p>The primary cost data is the fixed sum. Limited breakdown is provided and even when some level of activity schedules are used the veracity of the prices placed against them is militated against by the practice of front-end loading "preliminary" items to make the project self funding.</p>	<p>As stated, the activity schedule approach provides a detailed breakdown and can be refined to provide additional or particular breakdowns via activity items.</p>
Identification and validation of alternative cost data (e.g. build up of costs where historic costs not available)	<p>It is possible for an experienced cost engineer to analyse the historic port folio of projects and apply a standard protocol in breaking them down. This will not however take account of the market conditions under which the projects were won or the risk profile adopted by the bidder in putting his tender together.</p>	<p>It is possible for an experienced cost engineer to take a port folio of target cost contracts and verify alternative cost models, i.e. a protocol can be developed to cover %age based allowances for a selection of identified direct and indirect costs.</p> <p>There then follows an argument that such verified models can be used to test standard costs across the companies.</p>
Development of costing formulae or algorithms	<p>Provided that it is possible to breakdown the lump sum and validate the data, then it may be possible to develop a costing algorithm. This should be possible for infra works where lump sum contract works more closely align with standard cost items; less likely to be practicable for non-infra.</p>	<p>It is possible to hypothesise a situation where the cost curves prepared by the benchmark company could be verified and weighting factors introduced to cover for individual Company practices and geography.</p>
Development of standard costs and capital programme estimates.	Info not available	<p>By the adoption of the open book approach, access can be gained to both project specific and programme specific on costs. A protocol can then be developed for their application to standard costs.</p>

Table 5 Comparison of Preparation of Standard Costs under Lump Sum and Target Cost Payment Mechanisms

Generic Requirements

Whether a fixed lump sum or target cost approach is adopted for procurement, the information required to build up the standard cost needs to be readily extractable from the contract document activity schedule / work items.

Lump sum contracts place the majority, if not all, of the risk with the Contractor and the principal figure is the fixed lump sum. Activity schedules are coarse and there is no supporting detail to underscore the veracity of the actual item by item cost allocation. There are no drivers for either the

Advice on Capital Works Unit Costs (Cost Base)

company or the contractor to request / provide a detailed in-depth breakdown.

Target Cost contracts by their very nature provide detailed activity breakdown with full supporting details.

Generic Approach

Such an approach is typified by the adoption of a structured approach to building up the tender document schedule of activities / work items. This already exists within the framework of a Target Cost but will be a challenge for a fixed lump sum project. It is possible to impose a listing of the actual activities but it is less possible for the requirement to provide the supporting details to be imposed without qualifying the Form of Contract.

3.2.9 Summary of Findings

- Use of packages such as AIMS, ICEMATE, SAP etc as data collection mechanisms are only as good as the Project Manager evaluating and inputting the breakdown of the Out-turn price AND the coarseness of the breakdown.
- A guidance note in respect to the treatment of direct costs, indirect costs, on-costs and overheads relating to a project to provide consistency in derivation and therefore higher confidence levels in the standard cost data, would be beneficial.
- As outlined in Section 3.2.5, the Pain / Gain is applied to both project and programme level. It is possible for there to be separate mechanisms applicable at each of project and programme level. The simple approach is to aggregate the net Pain / Gain from both levels into a single pot, and hence percentage, for application to the standard cost.

3.2.10 Conclusion

1. There is presently no generic approach which will allow a high level of cost disaggregation to be achieved across all Forms of Contract/procurement approaches. Guidance on this process is provided (section 3.2.6) but would need to be tested to confirm that the desired outcome of reducing non-efficiency related variance is achieved. Either further discussion with individual water companies or a workshop which will highlight the difficulties of disaggregation and refine the guidance would be beneficial.
2. For those companies not using a joint cost capture approach, their presently practiced methods will continue to result in unreliable standard costs.
3. The merits of common business systems are demonstrated by those companies who employ a high level of integration with their Alliance partners and achieved some of the lowest catch-up factors in the context of the AMP4 Final Determination. In the longer term of AMP5 and

Advice on Capital Works Unit Costs (Cost Base)

beyond, the use of common business systems, specifically joint cost capture should be encouraged. There is logic in Ofwat adopting an incentivising approach in PR09 to encourage the companies to design and launch their own integrated data capture systems with their partners OR standardise on one estimating package complete with an agreed protocol for its use.

4. Any amendments made to the data collection process at contract activity level will not assist PR09. Evaluation and implementation of the changes will not impact until PR14 by when a database will have been built up.

3.3 Assess the Independent report published after the 2004 price review (produced by Arup/ EC Harris), and recommend appropriate responses relevant to the two main scope items stated above.

3.3.1 Introduction

Arup/ EC Harris were appointed by Water UK to prepare a report which reviews the Periodic Review 2004 (PR04) Cost Base process and draw conclusions on:

- The overall proportion of the differences in Companies' standard costs, which might represent inefficiencies.
- The extent to which genuine inefficiencies in Companies' standard costs might be removed from those components of companies' capital programmes which are similar and dissimilar to standard schemes.
- The time frame for which it might be reasonable for companies to remove these inefficiencies.

Their approach comprised a review of changes made to the Cost Base 'Information Requirements' since 1999 Periodic Review (PR99) and an industry-based questionnaire to obtain details of how individual companies viewed the standard costs in relation to their investment plan estimates.

The report recognises that a number of improvements have been made to the documentation and process. However, despite these improvements, the majority of respondents to the questionnaire remained sceptical that the process achieves what it sets out to do or is as clear and transparent as it could be.

There is clearly significant variation in the standard cost submissions and examination of the questionnaire responses identified a number of potentially material issues which may have influenced the standard costs and which the report authors consider are not related to capital efficiency. These broadly include issues surrounding interpretation of the specification, alternative process solutions, basis of calculation of standard costs, sources of data and the Ofwat methodology.

In the opinion of Arup/ E C Harris, only a limited proportion of the demonstrated range arises from efficiency, with the balance of the difference being related to deficiencies in the approach used by Ofwat or in the data provided by companies.

For 74% of the standard costs examined, in their opinion, between 5% and 40% of the range arises from efficiency. In a further 14% of cases where the gross range exceeds 200%, the authors suggest that these standard costs provide limited information on relative efficiency, and should be removed from the analysis.

3.3.2 Assessment

The above report, entitled 'Review of the Cost Base process', was subject to line by line assessment. Comment was added to the text wherever a response was considered appropriate in order to clarify assumptions made,

Advice on Capital Works Unit Costs (Cost Base)

to correct apparent errors in interpretation of the Cost Base 'Information Requirements', to identify areas of work needed to improve the 'Information Requirements' and to identify inconsistencies in the tabular and graphical summaries of information. Extracts of the report text and our comments in relation to each extract are given in Appendix C. A full copy of the marked up Arup/ E C Harris report is available if required.

The key hypotheses which form the basis of the above report are as follows:

- Variance in the standard costs can never be accounted for solely by the relative efficiency
- Where the highest standard cost is not more than 25% above the lowest, 70% or more of the variance can be accounted for by relative efficiency.
- Where the highest standard cost is more than 100% above the lowest, 5% to 20% of the variance can be accounted for by relative efficiency.
- At the two extremes, where the standard costs are identical, 100% of the variance is due to relative efficiency (i.e. 100% of nothing!) and where the variance exceeds 250% none of the variance can be accounted for by relative efficiency.

Based on the above hypotheses, the report identifies the proportion of variance that reflects differences in efficiency and explores the reasons for the degrees of variance, taking due account of the responses from participating companies.

However, the 'Review of the Cost Base process' appears to make one fundamentally erroneous assumption, i.e. that the 'process' is measuring genuine inter-company efficiency, where as it is designed and utilised to measure the relative efficiency of the capital investment estimates, using 'standard costs' as sample or surrogate values.

Actual capital efficiency can only be measured after the event, when the benefits of efficient management at all levels and stages can be re-assessed and such post project assessments should form the basis of the standard costs.

Tabular and graphical summaries support the reports conclusions using both standard cost data and questionnaire returns. It was noted that a number of the standard cost frequency diagrams were inconsistent with the base data and those which drew on questionnaire returns were at times inconsistent, one with another, suggesting that the data was based on differing interpretations of the questionnaire.

Whilst we raise a number of queries as to the validity of the above report's conclusions, we recognise that it highlights a number of 'needs' with particular reference to PR'09 and these are summarised below.

3.3.3 Summary of findings

Our assessment of the report is given above and our findings as regards improvement needs are as follows:

Advice on Capital Works Unit Costs (Cost Base)

- The need for a better understanding, by the companies and the Reporters, of what the Cost Base methodology is trying to achieve and of how the 'Information Requirements' are to be interpreted.
- The need for consistent challenge by the Reporters to give confidence that all companies standard costs have been developed in a manner consistent with the 'Information Requirements' and that there is a 'level playing field' before catch-up factors are determined.
- The need to ensure that regional cost differences, both high and low, are taken into consideration and companies are not put at a disadvantage with regard to the efficiency assessments.
- The need for greater transparency in how companies unit costs data is adjusted (downwards) to produce standard costs; companies would like to see more detailed information made public with particular regard to indirect costs (on-costs and overheads).
- The need for greater clarity in the 'Information Requirements' and the elimination of potential ambiguities or opportunities to re-interpret the guidance provided.
- The need to take account of the factors which may result in higher costs for reasons out with the company's control (for example, being limited to sub-optimum distances for pipe laying) or, alternatively allow companies to optimise their costs.
- The need to review the line guidance for non-infrastructure items with specific regard to raw water quality and potential treatment solutions which could lead to standard costs that are not comparable.
- The impacts of modern procurement and contracting practice need to be taken account of in terms of the level and type of information which is available to companies and the method of approach to assessing capital efficiency. However, some company responses to the Ofwat Working Group considered that this was either not an issue or was currently being dealt with by them.

Notes provided by Ofwat from the Working Group meetings with participating companies and the results of a Workshop held at Ofwat offices on 28 February 07, support the above conclusions and the need to take appropriate action.

The Arup/ E C Harris report presents a number of hypotheses and opinions but does not provide clear evidence as to the proportion of variance that reflects differences in capital efficiency. In order to address this issue, we have carried out an audit of standard costs submitted at PR'04 and the results of this assessment along with advice on how the guidance could be improved are dealt with in Section 3.2.6.

Advice on Capital Works Unit Costs (Cost Base)

3.4 Review and assess the variance analysis already completed by an industry working group on a selection of Standard Costs (6 non-infrastructure standard descriptions; 3 water and 3 sewage service).

3.4.1 Introduction

Ofwat together with the participants of the industry working group looking at Cost Base has completed a data collection and analysis process. Participating companies together with the standard cost items examined are summarised in Table 4 below;

	C3L1 – Treatment works 30MI/d	C3L2 - Filtration System 30MI/d	C3L7 - Crypto protection	C7L12 - First time rural sewage	C7L15 Nutrient removal	C7L16 - Ammonia Removal
WASC5	Y	Y			Y	Y
WOC4	Y		Y			
WASC3	Y	Y	Y	Y	Y	Y
WASC2	Y	Y	Y	Y	Y	Y
WASC6		Y		Y	Y	Y
WASC4		Y		Y	Y	Y
WOC5			Y			
WOC6			Y			

Table 6
Data Collection & Analysis Process

Our review and assessment of the variance analysis carried out by an industry working group, is based on an objective rather than subjective assessment of the estimating processes used.

The relevant factual information included with the industry working groups analysis, forms the basis of our review. The review is supported by the subsequent analysis of company audit responses submitted under this present project in order to draw objective conclusions. We have drawn on our experience of the Cost Base process over the last three Periodic Reviews and, more importantly, on the knowledge gained from recent detailed audits of costs and estimating processes within the Scottish and Northern Ireland water industries.

The scale of variance has been demonstrated in the various Ofwat reports on unit costs, most recently, Water and Sewerage service unit costs and relative efficiency, 2003 – 2004 report, issued January 2005. In the appendix to RD 17/06, it is recognised that a proportion of the variance

Advice on Capital Works Unit Costs (Cost Base)

between companies Cost Base costs does not represent differences in efficiency and a number of reasons for this are suggested.

In their 2004 *Review of the Cost Base Process*, Arup Harris made a subjective assessment of the variance and the real comparative efficiencies. However without substantive audit data from individual companies, we do not believe it is possible to make a wholly valid assessment. This is born out by the fact that the Reporters, despite being challenged by Ofwat, have on several occasions been unable to identify the reason for some of the lowest and highest standard costs submitted.

3.4.2 Summary of Findings

(Note Working Group Comments in ***bold italics*** and Jacobs comments in normal font)

- ***Reporter involvement appears to vary between Companies, with all looking for demonstration that unit costs used in Cost Base have the same basis as those used in the Business Plan, but less attention in some cases to the process design principles and underlying assumptions.***

Inconsistency between Reporters is at present difficult to quantify in terms of the impact on the Cost Base submissions. Horizontal audit of key parameters / factors and add-on's would be a benefit. Alternatively a tighter specification of the format and build-up of costs may reduce the variance.

Additional and consistent information provided to the Reporters and more rapid turnaround of review of submissions providing feedback to Reporters would enhance the review process as Reporters would have visibility of the build up of the submitted costs. This could be facilitated by the use of a spreadsheet/database utility (MS Access or Excel) for companies to enter/ submit their standard costs information; the spreadsheet would include drop down menus and check boxes which have to be completed in order to move from one step to another.

This is discussed in detail in Task 8, Section 3.8.

- ***Relevance of the standard cost to recently completed work and that required in the projected capital programmes. In some cases available recent cost data is not available, which calls into question the relevance of the standard cost being used to assess procurement efficiency***

Better guidance on the preparation of unit costs where no historic data is available is required. This could be supported by the input spreadsheet/database utility described above which would adjust the 'required' fields depending on the data source.

Analysis by standard cost covering the PR04 submissions to quantify the split of historic and other data sources would provide a measure of the validity and applicability of each standard cost. Those standard costs

Advice on Capital Works Unit Costs (Cost Base)

that have been derived from sources other than historic data by the majority of water companies may need to be critically reviewed.

- ***Application of whole life costs and degree of risk assumed that can be taken with particular processes and what this means for the design parameters used in determining the size of process units.***

In part the relative attitude to risk is taken account of in the Ofwat environmental quality elements of the returns hence there are checks and balances. However water companies have expressed concern that standard costs are sometimes not wholly comparable and the Cost Base process does not necessarily flag this.

This demonstrates the benefit of supporting data being provided with submissions. The proposed Excel/Access data input interface could specify which factors/parameters/percentages are to be provided and the precise format would facilitate a rapid horizontal review giving guidance to Reporters when assessing the submissions.

Greater transparency is also a key issue with water companies and visibility of their factors relative to the rest would give useful indicators in terms of focusing on efficiency and correcting assumptions that may result in outlying standard costs.

- ***The valuing of exclusions is likely to explain some of the large variations in unit costs. The use of a more detailed proforma may be appropriate in the future.***

This is demonstrated in the graphs presented earlier in this Section where there is a large range of relative magnitudes between the prime cost items and the total costs. Comparison of the disaggregated factors/parameters/percentages would facilitate the key factors to be critically examined by the Reporters and reviewed to focus on the comparative efficiencies.

Guidance on treatment of project management costs in the 'Standardisation' process is evidently required.

- ***In the case of some of the specimen projects examined (e.g. C7L16), different solutions were put forward by Companies which led to significant variation in cost. On further examination it is clear the solutions proposed by the Companies in question were indicative of the type of solutions that they would have implemented in reality. In this way the Cost Base does reflect some aspects of capital efficiency.***

Guidance already asks for solutions that are consistent with the capital programme. The proposal that disaggregated information should be submitted would provide confirmation of the key findings as well as identification of inconsistently developed factors / parameters / percentages.

It is recognised that the guidance does require review to ensure that it is clear, concise, consistent and focused.

- ***Ofwat Jacobs validation process – no evidence that they reviewed or explored the variances.***

Variance has been analysed as far as practicable using the available data.

Guidance to Reporters and better data management will improve the validation process. Using a database approach will facilitate rapid logic checking and analysis to rapidly pass on findings to Reporters. This in turn will potentially enable submission reviewers and Reporters to focus on the tasks that add most value.

3.5 Review the minutes from the Company visits carried out by Ofwat.

Ofwat undertook a series of meetings with selected water companies between March and December 2006. These meetings typically comprised a one day review with the following objectives:

- To gain a better understanding of how companies derive their standard costs
- To understand what assumptions/interpretations companies have to make in order to comply with the Cost Base Information Requirements
- To discuss ideas of how to improve the process and enable a fair and worthwhile comparison of procurement/delivery efficiency

The meetings were structured as follows:

- i. Discussion on Cost Base submission:
 - Stage 1 – capturing and collating company data
 - Stage 2 – aligning company data and adjusting the costs to comply with Cost Base standard costs
 - Stage 3 – forecasting future spend and linking with the business plan
- ii. Review of standard costs that had a large range of costs across the industry
- iii. Concerns with and improvements to current Cost Base tools

The key findings (for consideration in this present review) are detailed in Table 7 and Table 8 below:

Advice on Capital Works Unit Costs (Cost Base)

Comment/issue raised by Water Companies	Jacobs Response
Stage 1 - Capturing and Collating Company Data	
Difficult to capture the level of detail needed to adjust real project costs to make them compliant.	This is recognised as a potential issue and improved guidance, Reporter training and breakdowns of submitted costs would improve the process of analysing and providing feedback on submission.
There is currently heavy reliance on the AMP4 delivery team accurately populating the database.	This is an internal water company issue and alignment of their internal processes should be encouraged.
Non-infrastructure are infrequently based on historic costs.	Standard cost coverage need to be critically reviewed.
It will take a few years to obtain enough outturn cost data.	Noted that for some companies this is an issue. It is evident from discussions that water companies are realising that they should seek to align their procurement process with the data requirements for Cost Base. This is a long term issue.
Stage 2 - Aligning company data and adjusting the costs to comply with Cost Base Standard Costs	
Poor ground conditions, environmental contractors, need for weekend working etc. All embedded within either the Contractor's overheads or risk allowance. Some standard costs interpolated from limited historic information.	It is appreciated that this element of the process is subject to variable assumptions and can be difficult to audit. Obtaining the adjustment factors used by each company in a comparable format would facilitate rapid review and comparison to a. establish the scale of the problem and b. identify which specific companies may be applying factors that are out of step with the norm.
NRSWA costs vary significantly across their region.	Companies should be expected to normalise their variance across the region such that their submitted costs are representative of their overall programme.
For some cost descriptions the Cost Base costs are based on one contractor's schedule. For some Cost Based costs there are very few data points (e.g. crypto protection standard cost).	This is noted and the coverage of standard costs should be reviewed.
Stage 3 – Forecasting future spend and linking with the business plan	
It was estimated by one water company that no more than 50% of the standard costs for non-infrastructure are applicable to their business plan. Most of their WNI programme isn't covered by standard costs. A lot of the SI is either pumped or vacuum - not reflected in Cost Base.	The standard costs require review and we note that detailed analysis of the applicability of the selected costs in terms of coverage of the capital programme has been undertaken by Ofwat.
One water company reported that it only had 2 years of detailed cost data which was tender based - not outturn - they will be in a stronger position for PR09.	Noted that for some companies this is an issue. It is evident that water companies are realising that they should seek to align their procurement process with the data requirements for Cost Base. This is a long term issue.
Contractor used to cost the schemes may not be the Contractor in place when the scheme is delivered.	This is not an issue if the standard costs and comparable investment cost estimates originate from the same sources.

Table 7

Advice on Capital Works Unit Costs (Cost Base)

Criticism/issue raised by Water Companies	Jacobs Response
The variation in costs is due to misinterpretation of the standard specification not inefficiencies.	This supports our view that the guidance requires review and also that an enhanced data input process that stipulates the form of the information required and the extent to which the breakdown of standard costs is detailed; this would facilitate greater horizontal audit and analysis of variance encountered.
Having different frontiers for OPEX and CAPEX doesn't allow for trade offs - leading to unrealistic benchmark (BM) targets for some companies and doesn't consider/ promote least Whole Life Costs (WLC).	The Opex/Capex balance is allowed for within the overall determination econometrics process. In practice, less than half the interviewed companies expressed concern as regards the Opex/Capex issue.
Standard costs aren't representative of the future capital programme (Non Infrastructure in particular).	The standard costs require review and we note that detailed analysis of the applicability of the selected costs in terms of coverage of the capital programme has been undertaken by Ofwat. Identification of representative standard costs is critical if the Cost Base process is to remain valid.
The time period allowed for companies to "catch-up" is insufficient (all enhancement catch-ups have to be made in 1st year; maintenance over 3 years)	Noted and this is a point for further discussion. There was no consensus view on this issue among the companies interviewed.
The process for deriving efficiency targets through the use of Cost Base is still not transparent or clear	Use of a database/direct data input approach that allows rapid turn round of feedback on the relative Cost Base costs and also provides information to reporters in more detail and more quickly would improve the level of transparency.
On Non-infra projects we don't specify WQ parameters - leading to significant variation in process they choose	This should be addressed in the detailed review of standard costs and guidance.
Some companies feel they don't benefit from economies of scale – this should be included as a special factor.	It is recognised that there is potentially an efficiency issue; however only a minority of companies interviewed felt that they were disadvantaged. This process possibly requires further consideration.
The regional adjustment only takes higher cost areas into account - companies operating in low cost areas are not adjusted. (some BM companies are operating in favourable conditions that others can't replicate)	There was no strong agreement on this issue amongst the companies interviewed. Their main concern was to ensure a level playing field prior to benchmarking. This issue would benefit from detailed consideration prior to evaluation of the PR09 Cost Base submissions.
Companies with costs below the benchmark are not rewarded	It is considered that the mechanism for selection and application of catch-up factors is robust as the benchmark is normally selected as the lowest compliant cost. Low cost submissions are challenged through requests for clarification via the Reporters.
Cost Base doesn't align with new contracting agreements	This is noted and agreed. Further detailed review of this issue and appropriate adjustment to the Cost Base process should be considered.
More clarification is needed to define indirect costs (overheads, risk, fees)	This is noted and agreed. This supports our view that the guidance requires review and also that an enhanced data input process that stipulates the form of the information required and the extent to which the breakdown of standard costs is detailed

Advice on Capital Works Unit Costs (Cost Base)

	would facilitate greater horizontal audit and analysis of variance encountered. Further detailed review of this issue and appropriate adjustment to the Cost Base process should be considered.
Need more consistency for adjusting investment costs into standard costs	More detailed breakdown of the submitted information together with consistent format would facilitate analysis of the processes of each company to promote consistency of approach. A breakdown of the process would enable horizontal audit to be undertaken and consideration to specific guidance to Reporters should be given
Standard costs differ significantly depending whether they were developed "bottom-up" or "top-down"	This is noted and agreed. More detailed breakdown of the make up of costs would facilitate improved understanding of the reasons for this possible discrepancy.

Table 8

3.6 Carry out a horizontal audit of the following standard costs for a representative sample of companies. It is expected this will require contact with around six companies, which should include the lowest, highest and benchmark companies for the selected standard costs and a representative mix of water and sewerage and water only companies. Identify for each company when compared to the benchmark how the variance in cost can be attributed (i.e. what proportion could be as a result of efficiency and what proportion could be attributed to misinterpretation/ errors or other sources of variation). The reference in brackets states the location of the standard cost description.

- Mains Laying, nominal bore 200 mm, rural highway (TC1, L3)
- New treatment works SW2, output 30 MI/d (TC3, L1)
- Cryptosporidium protection to an existing borehole treatment works, output 2.5 MI/d (TC3, L7)
- Replacement MCC for variable speed station, capacity 90 kW (TC3, L18)
- Sewer laying, diameter 150mm, rural highway (TC5, L1)
- First time rural sewage treatment p.e. 200 (TC7, L12)
- Additional nutrient removal at existing secondary works p.e.40,000 (TC7, L15)
- Additional ammonia removal at existing secondary works p.e.2000 (TC7, L16)

In order to undertake the assessment of standard costs for the above assets, a standard data collection sheet or questionnaire was derived. This set out, for each asset, the principal cost components that make up the standard cost including civil, M&E, deductions and on-costs. Each of the chosen water companies were issued with the questionnaire and requested to allocate costs to the specific components to enable the horizontal audit to be undertaken.

Summary of findings

The key findings relating to Section 3.6 are presented below;

Based on the above horizontal audit of the selected standard costs, it is clear that the companies have many varied ways of presenting and calculating the data for the cost base returns.

Some format of standardisation of information returned, similar to the questionnaires issued for this assessment would be beneficial for the future comparison process. Some companies provided limited data for this exercise and in order to gain maximum benefit from this process it will be necessary for all companies to return the data in the format requested, without exception and submissions will need to be returned to the companies if not provided in the correct format.

Some form of workshop/training, for both the companies and their Reporters, on how the data should be returned would be beneficial together

Advice on Capital Works Unit Costs (Cost Base)

with what is and is not acceptable in terms of Project Management percentage reductions etc.

This assessment has identified some misinterpretations of the specification that would not be picked up from the normal returns and has therefore been a useful exercise. This format of the questionnaire can be used to confirm what has been costed. However the potential benefits could be limited by the variation in methods used by the companies for data collection and assessment, unless each percentage is mandatory in the returns. The allocation of the overheads vary across the companies depending on the procurement routes adopted.

The assessment of the on-costs varies widely across the companies where this data has been returned but all state that this is reflective of the company business plan. The variation may be due in some part to the different contractual approaches and procurement methods employed, as discussed in relation to Tasks 1 and 2. Some companies have applied the tender to outturn ratio for infrastructure costs built up from schedules and others have not, emphasis needs to be given in the guidance and proposed training workshop to achieve consistency on this item as ratio is as high as 11% in some cases where real projects have been used for the assessment.

The approach to solutions varies depending on the risk/ whole life cost model adopted by the water company which will impact on the OPEX model also. Further clarification of the link between the CAPEX and OPEX assessment and the derived catch-up factors could reassure companies that this has been taken into account.

In cases where the same process solution has been costed it is evident that the cost variation across the companies is minimal indicating that most of the variations are as a result of solutions proposed and therefore efficiencies.

3.7 Identify the critical comparable stages/ processes used by each company in the standard cost calculation.

Factors affecting Companies ability to prepare standard costs.

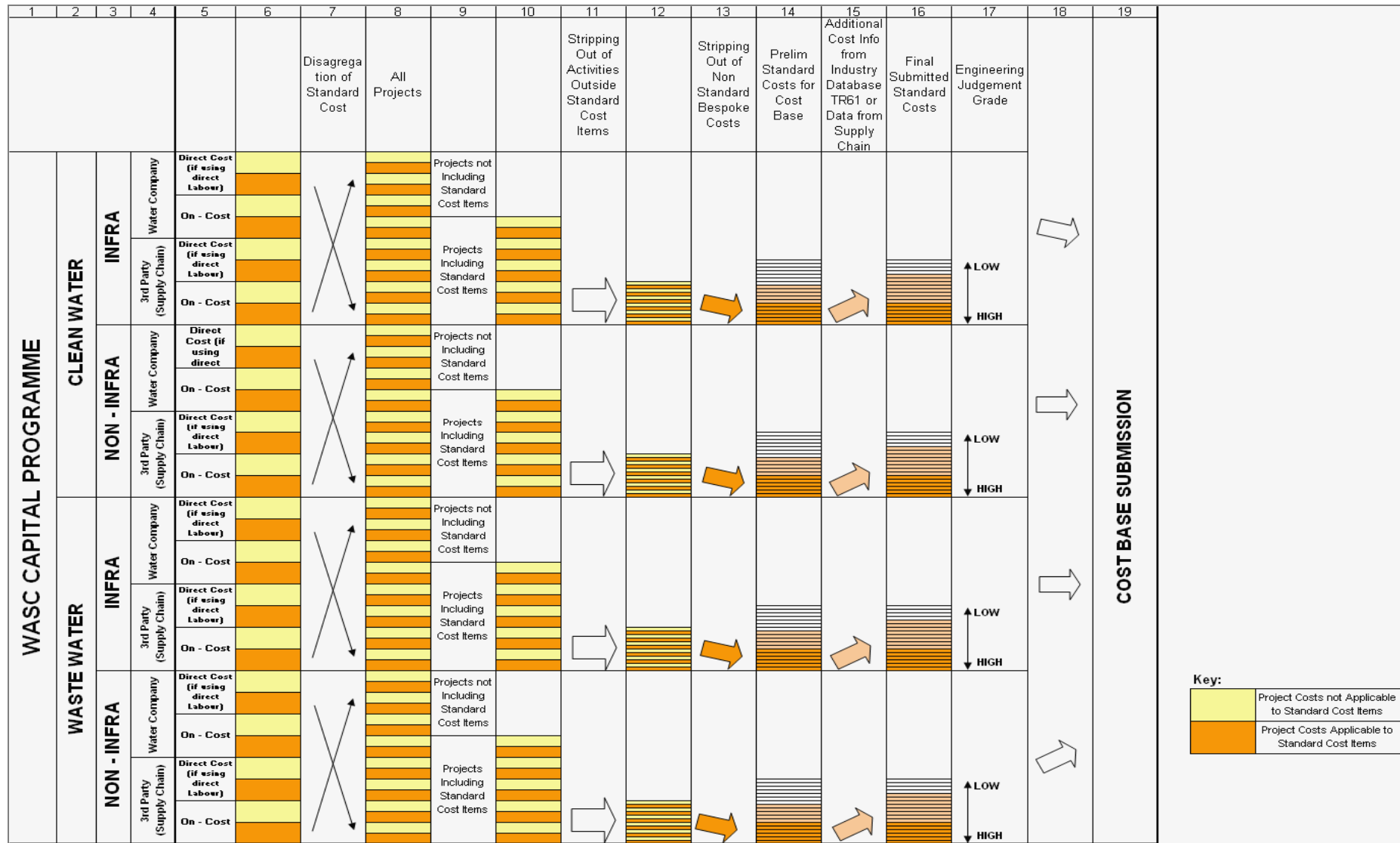
It is evident from Sections 3.1 and 3.2 of this report that the influence of procurement approach on the ability of companies to satisfactorily complete standard costs is significant. The key factors determining whether companies are able to provide robust standard costs are;

- Alignment of supply chain reporting of costs to the Cost Base requirements.
- Visibility by the Company of supply chain cost data.
- Identification of, and accurate calculation/division of, costs that relate specifically to the standard cost as opposed to other elements of works under a single project.
- Split between direct project costs and on-costs (programme management, overheads etc) for both the supply chain and the Water Company (note that direct costs may apply to the Water Company if direct labour or client supplied materials are used).
- Removal of company specific or non-standard costs (such as unforeseen ground conditions, unusually onerous traffic management etc) from a standard cost item.
- Apportionment of on-costs and direct costs of both company and supply chain to standard costs.
- Availability of sufficient numbers of matching historic projects to give project data for bottom-up or top-down costing of standard costs.
- Ability to adjust similar but not matching historic project cost data to accurately and robustly produce standard costs. For example, if the standard cost relates to a 300mm diameter pipe and the Water Company has data for a 225mm diameter pipe, has the Company adopted a reasonable and realistic approach to adjusting the cost?

Critical Comparable Stages

The processes used by each Company will vary depending on which of the tasks listed in the bullet points above they are able to undertake. The full range of stages are illustrated in Figure 4. This figure shows the comparable stages (note only the top half of the figure would apply to Water only Companies) and in practice there is a hierarchy of processes whereby there will be optimum processes that depend on conditions (such as data availability) being met. If the most optimum process is not possible then a Water Company will explore less robust methods until all approaches are exhausted and a nil return for a given standard cost is selected.

Advice on Capital Works Unit Costs (Cost Base)



Advice on Capital Works Unit Costs (Cost Base)

The critical comparable stages used by each company in the standard cost calculation are discussed below with reference to Figure 4. It should be emphasized however that different companies will place varying levels of emphasis on the steps shown depending on their situation including availability of data. It is envisaged that Companies who have aligned their cost data capture processes with the Cost Base process would start at the left hand side of the table and work through the stages for a high proportion of standard costs. By contrast, those companies with poorly aligned cost data capture (for example those who have transferred responsibility for programme delivery to a 3rd party with little visibility of disaggregated costs) are likely to rely more heavily on Column 15 where data is obtained from industry standard cost databases.

The process is discussed stage by stage below;

The starting point (at least as a point of reference) should be the Company's current capital programme (refer to Column 1 of Figure 4) subdivided first into clean water and waste water (Column 2) and then further subdivided into infrastructure and non-infrastructure (Column 3). This follows the typical divisional structure of Companies. There are also likely to be regional divisions plus further sub-disciplines such as reservoirs, treatment etc but for the purposes of the illustrated model we have focused on the high level divisional structure which is generally valid because the subsequent stages correspond to groupings under the Cost Base process.

With reference to the Figure 4 – Column 5 it is considered that a Company will have an appreciation of the overheads, on-costs and direct costs for each of the four business divisions. Overheads will comprise;

1. Management and corporate services overhead split between the four divisions logically either pro rate based on CAPEX/OPEX or on revenue.
2. Divisional overheads including management, purchasing, project management and in-house design services.

It is considered likely that this level of calculation of overheads is most likely to generate an accurate figure distributed to all projects. This cost is therefore generated using a top down approach.

Column 5 also shows an element of Direct Cost against the Water Companies. This may represent the capital works undertaken by the Company's direct labour and may be a relatively small proportion of the overall capital spend. However, because the Company will have full vision of the costs of delivery by the direct labour force it may use this data as representative of its broader programme.

There is a risk in this case that the direct labour may not be operating at the same efficiency as the broader supply chain. Companies could check whether this is the case by comparing unit outturn costs and factoring accordingly. The proportions by which project costs are disaggregated based on the bottom up costs from direct labour, may well be robust and in any event may be the best option available if such data is not available from the supply chain.

Column 6 shows that for each of the divisions in Column 5 there will be Company/project specific factors that need to be applied to unadjusted project

Advice on Capital Works Unit Costs (Cost Base)

costs to develop standard costs. While some of these specific costs can only be determined at project level by forensic analysis of the outturn cost data, there will be some regional factors that are generally applicable to the projects.

The next step is to link the top down capital expenditure to real projects. This is shown in Column 7 as a matrix style apportionment. This is because a specific project may include works from more than one of the upstream divisions. Ideally this should be done using outturn disaggregated costs. Overheads and on-costs should be carried across flagged as to whether it is applicable to the standard cost or bespoke company/project specific costs.

The process of reducing project costs to standard costs begins in Column 9 where projects that do not contain any of the standard costs can be discounted. It is however essential that the quantum of these projects is known in order that the link back to the capital programme can be maintained. The projects from which standard costs can be derived are shown in Column 10. For these projects the standard cost items must be extracted. It is likely that a medium to large project will require considerable analysis to accurately take off the standard cost specific tasks.

The next stage is to remove the bespoke company factors. Note that these factors will have been refined since Column 6 to also take account of projects specific factors such as unforeseen ground conditions. The level of detail in researching of the non-standard items will in part depend on the alignment of cost data capture between the Company and the Contractor.

In Column 14 the first cut of the derived standard costs is shown. Many companies will not be able to complete all standard costs because of limited or non-matching project data. Column 14 shows that typically some of the standard costs will now be robust; others may require further refinement and some may simply be impracticable.

The final stage in Column 15 represents the process of adjusting preliminary standard costs to align with the item description. This process may involve re-costing of completed schemes that do not quite match the cost base standard cost item description. For example, a Company may have costs for 300mm diameter pipelines where standard costs are for 225mm pipelines hence a reasoned adjustment would be required. It should be noted that from our experience of assessment of Cost Base submissions it is often at this stage that Companies focus their efforts and submit a standard cost that will not meet Ofwat requirements either because they are based on industry data sources that do not necessarily reflect the Company's efficiency or because the Company has not paid adequate attention to the assignment of overheads / on-costs and removal of non-standard costs. However, we would emphasise that in order to substantiate this view further forensic analysis of standard cost build-up or further investigation by Reporters would be required.

Discussion on Companies Ability to Complete Standard Costs

An assessment of the ability of each company to complete standard costs would be an onerous task (beyond the remit of this study), which in practice is carried out by the Company Reporters whose job it is to audit these activities and ensure that they have been carried out in compliance with the Cost Base 'Information Requirement'. However under this investigation we have requested

Advice on Capital Works Unit Costs (Cost Base)

disaggregated information relating to cost data and also we have been provided with returns made directly to Ofwat (discussed in Section 3.4). Our discussion is based on the returns made by water companies under this investigation and also our wider appreciation of the Cost base process from the last three price reviews.

In reviewing the build up of standard costs we note that the companies have several different ways of deriving the costs (see Section 3.9). As part of this report we have attempted to review the comparable stages that the companies go through for the assessment of the standard costs. We requested that the data be returned for standard headings in order to compare variations in the cost build up. Most of the companies returned a breakdown of the costs as requested but WASC2 were unable to provide this, stating that they did not capture the data at the level of detail we requested

Some companies captured and recorded costs for the basic construction and then identified reductions; Management costs and the company overheads were identified separately. Others were not able to provide this breakdown and the costs for the items included base costs, contractor overheads and contractor design with limited company overheads listed as an add-on percentage

In some cases the standard costs were derived from completed project totals from which exclusions are removed by reference to the contract breakdown to meet the specification i.e. top down. In other cases the company built up costs from a series of components i.e. bottom up using data from the unit cost database of completed projects. In the case of infrastructure, costs were often built up from schedules of rates.

In deriving standard costs from completed projects we have noted that some companies selected a single project which may have a low cost and used this to derive the standard cost return – this may be a low tender due to market conditions which would not be picked up unless compared to other similar projects undertaken by the company. However, each standard cost should be the standardised average unit cost representative of the total capital programme for this asset type.

One issue that causes debate is the application of the project management (PM) percentages. Some companies argue that the PM time attributable to extra and the difficult parts of the project are significant and that there is scope to reduce the PM overheads on top down assessments. For example;

- Project Total Cost £1m
- Standard cost Items £600k
- Additional Items £300k
- Design and Project Management £100k (11%)

It has been argued by some companies that a higher percentage of the design and PM time has been spent on the additional items than the standard cost items and therefore this should be a smaller percentage in the standard cost add-on's compared to that used in the business plan. In the example above the business plan would have 11% (100/900) and the standard cost may only have 8% applied. However if the standard costs are to be used as inter-company comparators with the purpose of adjusting company capital programme estimates, we believe that the average percentage on-costs (including PM) for all of the relevant parts of the capital programme should be applied to the standard

Advice on Capital Works Unit Costs (Cost Base)

cost. Some guidance to the companies on what is acceptable would be beneficial to ensure that optimistic figures are not used.

In the discussions with the companies we also found that in some cases the company had no historical data on which to make the standard cost return. In these cases the company has asked for tenders from Contractors for costs for the business plan and have used these figures to populate the standard cost. Some companies have used TR61 to build up the costs in the same way. If standard costs and capital programme estimates are derived on the same basis and include an appropriate level of on-costs, the objective of the Cost Base process should be achieved. However, if standard costs are derived using say, TR61 and there is no programmed investment in the relevant asset type, then the basis of catch-up factor applied to that company's investment programme could be undermined. Some guidance on this issue would also be beneficial.

The specification includes checklists that are required to be returned with the standard cost figures but the benefit of these is becoming questionable in light of their occasional miss-use at the last Periodic Review. It may be more beneficial to incorporate these into the general text of the specification rather than have them returned with the figures. The idea of having clearly listed items to include or exclude from the specification however is good and a less wordy specification would be beneficial.

As discussed in other sections it would be more meaningful to have a breakdown of the figures returned to enable comparisons to be made and to ensure that all the right components have been included. The concept of bills of quantities or cost breakdown in the format of standard costs may be one step too far, although some companies have adopted this approach to enable standard costs to be easily derived.

Summary of Findings

The eight key factors determining whether a Water Company is able to produce standard costs have been identified.

An illustration of the generic process of producing standard costs was prepared and has been used to highlight the comparable stages and also to comment on the contrasting approaches used by Water Companies due to constraints on the ability of each Company to follow the process.

The companies have many different ways of building up and presenting the standard costs based on procurement and data collection processes. In order to get a better understanding of the critical comparable stages or processes used by the companies it would be beneficial to ensure that a standard format for presentation of the costs is used. Due to the procurement philosophy adopted by individual companies there will be differences in where the add-ons are allocated and it may need to be mandatory for each percentage to be identified for all companies no matter where it sits so that this can be audited and cross checked against the business plan i.e. it does not matter whether design is with the contractor or done in-house but this type of information must be visible to the Reporter in order that the standard costs can be compared on a like for like basis.

Advice on Capital Works Unit Costs (Cost Base)

3.8 Recommend the validity of generic tests that may be applied. For example for each standard cost calculate the percentage adjustment made to a company unit costs (or source data) for compliance with the Cost Base description.

The PR04 Business Plan Cost Base Information Requirements identified generic and specific checks and validating information which was to be provided by both the Companies and their Reporters.

On receipt of the Cost Base submissions, the team responsible for the review and identification of catch-up factors used a series of spreadsheets to confirm or otherwise the validity of the submissions. The checking process resulted in a large number of queries, many of which were repetitive in nature, asking companies to review their submissions in the light of apparent errors, information deficiencies or costs which appeared to be outliers. Checks on the non-infrastructure elements of submissions were hampered in a number of cases due to the omission of requested information in relation to process stages.

The review process was carried out manually and in light of the time involved to obtain responses from companies and their Reporters, it was some times necessary to close out questions without having a full understanding of the causal factors.

The reviews and audits and the Workshop of 28 February 07, carried out as part of this 'Cost Base PR09 Development' project, identified a range of issues affecting the potential validity and comparability of submissions along with concerns that companies themselves have in regards to the benchmarking process. A brief summary of key issues is given below.

- Use by the industry of different contractual and procurement practices which do not always align well with the Cost Base principles
- The different contractual arrangements affect, for better or worse, the ability of companies to ensure compliance with standard cost descriptions
- Differing levels of system integration between companies and their contractors, which in turn affect the levels of cost data capture by companies
- The Arup/ E C Harris report suggests that the basis of the standard costs is not consistent from one company to another for reasons such as ambiguities in the guidance and inconsistent challenge by Reporters.
- Meetings with the industry working group, company visits by Ofwat staff and the results of a questionnaire based horizontal audit indicated that companies have many and varied ways of estimating and presenting their standard costs.
- The horizontal audit identified misinterpretation of the 'Information Requirements' by both companies and Reporters and a need for more detailed and standardised returns if a suitably 'level playing field' is to be achieved before benchmarking is carried out.

A consensus of views, derived from various contacts with the companies, indicates that the issues identified above, are resolvable and that the most proactive companies have resolved the various points of concern and are largely satisfied with the outcome.

Advice on Capital Works Unit Costs (Cost Base)

It seems clear that more detailed information is required as part of the Cost Base submissions, the information requirement must be enforced and a more efficient means of checking submissions and calling for any necessary clarification must be implemented.

Ensuring that the Cost Base 'Information Requirements' have been complied with calls for detailed (forensic) checking of the basic data and of the algorithms or cost curves used to translate unit cost data into standard costs and investment estimates. This is the task of the Reporter.

The Ofwat team by contrast require confirmation that relevant cross checks have been carried out, that the results were satisfactory or not as the case may be, and that the information submitted is, as far as the Reporter can determine, truly representative of company costs and investment plans.

At this stage a horizontal audit can be carried out (by the Ofwat review team) across all companies to identify any apparent anomalies and pose questions where the need arises. It is proposed that the basic checking process carried out by the Ofwat review team is automated to ensure a rapid turn round of queries and allow more time for a review of company specific issues, such as those related to contractual and procurement processes, and to non-infrastructure process information.

Generic Tests

Two issues need to be addressed;

1. Identify the parameters that can be tested and understand what the results of such a test will show, and;
2. Consider how these generic tests can best be applied under the review process considering best practice in data management/analysis.

Figure 4 (Section 3.7) shows the stages that Companies typically go through in the development of standard costs. As discussed in Section 3.7 it is evident that there are a number of different processes by which standard costs can be prepared (top down, bottom up, using Water Company data, supply chain data; industry cost estimation packages etc) and depending on the sources of data that are available there will be a wide range of approaches for bringing together the various components of a standard cost (on costs, direct costs, third party costs, non-typical costs etc). It follows that because the processes are going to be varied it would be difficult to compare those processes and draw meaningful conclusions. It is therefore considered to be better to examine the standard costs and a small number of key determining assumptions to identify outliers and to focus on these to challenge their validity and compliance with the Cost Base Information Requirements.

With reference to Figure 4 it is considered that for each standard cost the Water Company should provide the following specific supporting information;

Advice on Capital Works Unit Costs (Cost Base)

Table 9 – Generic Tests

	Standard cost item	A	B	C etc
	Standard cost (£K)			
1	% Water Company Costs ⁽¹⁾			
2	% Supply Chain Costs ⁽¹⁾			
3	% Water Company On-cost ⁽²⁾			
4	% Water Company Direct Costs ⁽²⁾			
5	% Supply Chain On-cost ⁽²⁾			
6	% Supply Chain Direct Costs ⁽²⁾			
7	Direct cost of principal standard cost components (£K) ⁽³⁾			
8	Direct unit cost of standard cost (£/m) ⁽⁴⁾			
9	% adjustment for non- standard costs ⁽⁵⁾			
10	Value of work by company during last investment period ⁽⁶⁾			
11	Value of work anticipate during next investment period ⁽⁷⁾			

Tests

(1) sum of %s in Row 1 and Row 2 should = 100%

(2) sum of %s in Row 3 to Row 6 should = 100%

(3) applies to non-infra standard costs and would be selected from a drop down menu of industry standard solutions with an 'other - please specify' option. Technical review of non-infra process elements carried out to ensure that the standard cost is for a plant which will deliver the service at an acceptable level of risk to the public/ environment

(4) applies to infra standard costs typically on a cost per unit length basis. Details of unit costs to be requested for comparison with standard costs – need average of composite investment infrastructure i.e. the unit costs derived from a top-down pro rate calculation.

(5) required to provide clarity on impact of stripping out of project/regional adjustments for atypical project costs

(6) Standard cost multiplied by actual volume of work in previous PR period to gain an appreciation of amount of historic cost data.

(7) Standard cost multiplied by expected volume of work in forthcoming PR period to facilitate cross check against Water Company capital programme.

In addition to the numerical information in Table 9 – Water companies should also provide a commentary detailing the origin of the unit costs and standard costs, the form of contract on which these costs were based indicating the practicability of aligning cost data with cost base requirements and the form of contract procurement to be used in the next AMP period.

Application of Generic Tests

In light of the above, the following proposals are designed to provide a process for applying generic tests which may be used to rapidly validate the submissions:

- Develop a spreadsheet (MS Access or Excel) for companies to enter/ submit their standard cost information (as detailed in Table 9 above) ; the spreadsheet to include drop down menus and check boxes which be completed in order to move from one step to another.
- The spreadsheet would be similar to that used in this project to gather standard cost details and carry out the horizontal audit. It would use menus

Advice on Capital Works Unit Costs (Cost Base)

requiring companies to indicate the assumptions made in compiling their standard costs.

- Companies to submit standard costs electronically with a breakdown as per the questionnaire spread sheet.
- All companies to complete the breakdown of process elements as requested in the standard cost information requirements
- Carry out a computerised comparative analysis to identify mean and outlier values/companies and automated requests for review by Company & Reporter
- Questions to be generated and issued to companies and their Reporters automatically where there are anomalies, such as outlier costs/percentages, with a traffic light type coding indicating the level apparent alignment/misalignment.

Summary of Findings

The 11 generic tests necessary to gain an understanding of the key assumptions made by Water Companies in producing standard costs have been identified. These tests would facilitate the rapid comparative assessment of Cost Base submissions both horizontally comparing Water Companies and vertically comparing the Capital Investment submissions with the cost Base submissions.

The means of acquiring the information is also discussed and the key requirement is consistency of the information provided in order that Water Companies can be compared rapidly on a like for like basis. The findings including observations on outliers would be fed back to the Water Companies and also to the reporters in order that anomalous base assumptions can be challenged and misunderstandings resolved.

Through the process of analysis and feedback/challenge of possible anomalous standard costs build-ups it is considered that variance due to factors other than relative efficiency can be measured and it follows that if such variance is significant, the downstream Cost Base benchmarking can be undertaken with this taken into account to produce more robust and fair catch up factors.

- 3.9 For each standard cost, examine the derivation of the unit cost (or source data) used to build up the standard costs. Then examine how these unit costs have been used to calculate the capital expenditure in the 2004 business plan, taking particular account of the variations in the application of on-costs.**

Our examination of the derivation of unit costs was based primarily on the responses given by participating companies to the three questions listed below.

1. Assumptions & qualifications to achieve Ofwat standard cost: how have you dealt with differences between capital programme and the standard cost specification?
2. Cost estimating algorithms: are the same formulae used for the standard costs & capital programme estimates (subject to the deductions given in the specification)? If schedules used for standard costs rather than actual completed contracts, please state.
3. Percentage add-on's for overheads etc: are the same percentages used for the standard costs and the capital programme estimates?

Summary of Findings

Derivation of Unit Costs (or source data)

With the exception of Mains Laying (C1 L3) very limited information was provided by the companies on the source data or derivation of unit costs used to build up the standard costs. Schedules of contract rates provided the source data for the mains laying standard cost and this would also appear to have been used to build up the Sewer laying rate (C5 L2).

Other Non-infrastructure standard costs appear to have been based on previous similar project outturn costs, contract costs and/or supplier quotations with adjustments to meet the Cost Base 'Information Requirements' in terms of the specific inclusions and exclusions. Specific exclusions noted were:

- On-costs for stores overheads
- Risk and contingency allowance
- Planning constraints,
- Land purchase,
- Ground conditions
- Access roads,
- Landscaping & fencing
- Third party compensation

Use of Unit Costs in '04 Business Plan Estimates

In general companies used the same formulae, costing algorithms, contract rates or supplier quotations for the purpose of standard cost and business plan estimates. There were specific exceptions noted by individual companies.

There was clear division amongst companies as to whether or not the same add-on percentages for overheads were used for standard costs and capital

Advice on Capital Works Unit Costs (Cost Base)

programme estimates – some simply said, ‘Yes’ and some said ‘No’ and gave a brief explanation.

The limited information derived from examination suggests that there is a consistent variation of approach between companies, which is likely to result in standard costs that are not directly comparable. However, without carrying out an in-depth comparative analysis, it is not possible to assess the extent to which this may or may not bias the results of the Cost Base process.

4 DISCUSSION AND RECOMMENDATIONS

Discussion

Potential changes that would better align the Cost Base with industry current capital programme practices.

The present industry procurement processes cover a spectrum from project based competitive single tender to long term alliancing frameworks.

The application of a business system across an alliancing framework which incorporates a joint cost capture mechanism will typically allow the standard cost to be prepared to a higher level of confidence compared to those who develop standard costs by other means. Where the joint systems do not exist there would need to be special provision within the contract to expose unit costs. This is likely to take time to achieve as to retrospectively change existing procurement arrangements in areas of such commercial sensitivity.

Competitive procurement routes are typically lump sums offered making disaggregation of the project costs difficult and are therefore less readily aligned with the preparation of standard costs.

From our experience it is evident that better visibility of the build up of standard costs is the key to identifying reasons for variance across the industry and will allow Ofwat to establish whether a joint cost capture system is essential for companies to produce compliant standard costs. With a more rigidly defined process in place for the presentation and analysis of Cost Base submissions it would be possible to provide rapid feedback to the Reporters who in turn would be better able to challenge the sources of variance if they are directed towards those elements.

Assessment of the proportion of variance that clearly reflects differences in efficiency

Standard costs examined in this study have highlighted a wide range of sources of actual and potential variance (which will include differences in efficiency). Because of the range of identifiable causal factors leading to variance the key recommendation is to require better visibility of the build up of costs and to introduce appropriate processes to identify and correct non-efficiency related variance quickly.

We consider it impractical at this stage for Ofwat to provide sufficiently tight Cost Base guidance (which is essentially a product specification process) to achieve consistency – there is too much variation in fundamentals such as procurement processes, assumptions made, volumes of work etc – the more effective way to identify non-efficiency related variance is to apply a quality control process to the elements that make up each standard cost (on costs, direct costs, site/regional factors etc) where outliers are investigated by the Reporters and there is transparency across the industry of the disaggregated build up of standard costs.

A rigid data entry process detailing the necessary disaggregated elements of the standard cost to be input by water companies would support the guidance provided and promote consistency to permit an effective horizontal audit of standard costs.

Advice on Capital Works Unit Costs (Cost Base)

(a) to improve the guidance

The main actions requiring attention to improve the guidance are:

- Re-structure the 'Information Requirements' to provide a short front end description with diagrams illustrating the key elements of the process and emphasising the link between standard costs and investment estimates. The aim is to achieve a clear understanding of the aims and objectives before the development of the standard costs commences.
- Reduce the volume of text as far as practical without losing essential guidance and remove any duplication of information or instructions – say it once and once only. This will make the document easier to follow and reduce the opportunity for ambiguity or re-interpretation of the guidance.
- Consider removing the guidance to Reporter to a separate document.
- Correct ambiguities in the line descriptions in the existing Cost Base Information Requirements document where the specific lines are to be retained.
- Remove the requirement to complete hard copy checklists – this issue should be dealt with through the use of electronic spreadsheets for submission of standard costs as described in Section 3.8.
- Reduce the number of standard costs items and revise the list to better reflect comparable types of investment across all the companies – action to achieve this is understood to be in progress via others within Ofwat.
- Exclude standard costs based on TR61 or similar except where such costing packages were also used to produce the capital investment programme estimates.
- Specify that standard costs should be submitted only where a defined minimum percentage of the current capital investment programme is for works of a similar nature (this will need to be spelt out in detail). The aim is to ensure that estimates are based on reasonable knowledge and can be considered as valid samples representing the precision of the Business Plan figures.

An ultimate output from this project is updating of the Business Plan Cost Base Information Requirements to meet the needs of PR09. The general approach is identified in parts (a) and (b) of our recommendations. Completion of the process first requires agreement on the proposed changes to cost data collection, the level of detail to be included in submissions, the method of submission and identification of the individual standard costs to be used for PR09. Once these details have been confirmed, the Information Requirements document will be reviewed and revised on a line by line basis.

(b) to improve the assessment process used to expose variance not related to efficiency.

There are six key steps to improve the assessment process as follows:

Advice on Capital Works Unit Costs (Cost Base)

1. Improve the guidance provided in the Cost base 'Information Requirements' as described above.
2. Improve the companies and Reporters understanding of the 'Information Requirements' by means of Workshops and open forum discussions, possibly one event for each party.
3. Ensure that the Reporters carry out comprehensive audits and provide consistency of challenge with particular regard to the link between the standard costs and the unit costs/investment estimates – they must respond effectively to each issue and check request. In this respect, the Reporter team must be available to respond to queries in the month immediately following submission of the Business Plans, when the Ofwat in-house review takes place.
4. Incentivise the companies to develop and improve their cost data collection systems regardless of the types of contract or procurement processes utilised.
5. Increase the level of detail requested from the companies and ensure that information requests are fully complied with in order to permit an effective horizontal audit of standard costs, as described in our response to Section 3.8.
6. Increase the level of transparency as regards the make up of cost base submissions; more detailed information in the public domain.

Items 5 and 6 above would effectively be dealt with should the proposed electronic spreadsheet for submission of the standard costs and outlined in Section 3.8 be agreed and implemented.

