Capital Maintenance Planning
From a historical and future perspective

This paper has been written by Anglian Water as a contribution to Water 2020, Ofwat’s programme for determining the form of the 2019 review of water price controls.

July 2015
The knowledge and capability of asset management in the UK has evolved over the past 15 years.

The catalyst for asset management development in the UK water industry was the House of Commons Environmental Audit published in November 2000. Where the water industry was accused of ‘intellectual neglect’.

Since the commencement of AMP3 Ofwat’s and Water Companies’ asset management journey has been inextricably linked.

Since PR99 and the issue of MD161, Ofwat’s approach has centred around the Common Framework methodology (CMPCF), which by the middle of 2003 had developed into a substantial conceptual framework methodology facilitated by UKWIR. The output included a supporting ‘best practice manual’.

The following statement from Ofwat’s user manual of 2004 illustrates their thinking:

“The CMPCF has had a major impact in that it has become the de-facto standard of best practice, even to the extent that many companies refer to ‘compliance with CMPCF’. This implies that capital maintenance planning methodologies can be ‘tested’ against the CMPCF ‘standard’.

The following timeline clearly demonstrates the above.

However, in PR14 this forward looking approach was not explicitly used in the Ofwat modelling approach.

Asset Management Development Timeline

External Environment

May 2002
Capital Maintenance Planning – A Common Framework (CMPCF)
The Common Framework is founded on risk-based principles so that in most cases capital maintenance will be justified on the current and future probability of asset failure and the resultant consequences for customers, the environment and water service providers, including the costs arising.

April 2000
MD 161
Capital maintenance and operating expenditure, recognising the trade off between cost and risk, whilst ensuring compliance with statutory duties

1 November 2000
House of Commons Environmental Audit – Seventh Report
The Committee believes that this approach has amounted to intellectual neglect of this important problem.

Cost Efficiency

Historical expenditure approach

Forward looking risk based approach

PR99

PR04

PR09

PR14

AMP1
1990/95

AMP2
1995/00

AMP3
2000/05

AMP4
2005/10

AMP5
2010/15

AMP6
2015/20

May 2002
Infrastructure UK. Infrastructure Cost Review
Water Industry cost data mentioned as good practice

20 December 2010
Infrastructure UK. Infrastructure Cost Review

January 2004
NAO Out of sight – but not out of mind
Ofwat and the public sewer networks of England and Wales. Long term requirements of investment

February 2006
MD 212 Asset Management Planning to maintain serviceability

2007
AMPAP
Self assessment of company asset management capability

2007
ISO 55000
Feb 2014

2008

PAS 55 V1
2004

PAS 55 V2
2008

New Expenditure Framework
Infrastructure framework incorporating Totex and all investment areas

PR09

PR04

PR99

Forward looking risk based approach

External Environment

Regulatory Environment

Companies – Forward Looking Approach
Ofwat – Historical Approach

Gap

Asset Management Assessment (AMA)
Assessment of business plans adapted from AMPAP

3
Since 1920 there has been a gradual increase in expenditure. With the tightening of Drinking Water and Environment standards being the primary drivers.

The introduction of the Capital Maintenance Planning: Common Framework enabled the industry to answer the ‘why is the future different’ rather than a historical backward looking analysis which was used prior to AMP3 (prior to 2000).

In 2005 the industry had a step change in Capital Maintenance expenditure.

Customer expectations have seen increasing levels of service since privatisation which are expected to be maintained.
Historical expenditure trends

Water UK Published Data

The chart below details the trends in actual capital expenditure since 1920. The charts show the increase in investment since privatisation and the peaks and troughs that follow the regulatory cycle. There has been a rising trend in capital maintenance expenditure.

With the move to a totex modelling approach at PR14, it is not possible to separate out the comparable level of maintenance investment. The modelling approach undertaken by Ofwat for capital maintenance was based on historical data and no reference was made to companies’ forward looking risk analysis and application of the Common Framework.
Many of the new processes for water, wastewater and sludge treatment use advanced technology to meet more stringent standards, which are generally short to medium life assets.

At the same time, we have seen the growth in population and increasing demands for water from agriculture, both of which require the development and extensions to the asset base.
Impact of new regulations

### Water

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<thead>
<tr>
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<th>Process</th>
<th>Decision for change</th>
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Changes in treatment processes and regulations
In anticipation that companies would need to justify increased maintenance expenditure as a result of tightening quality standards and growth, two UKWIR projects were commissioned.

- Implications for maintenance of growth in the asset base.
- Understanding the impact on shorter life assets on the longer term maintenance requirements of the UK Water Industry

The result from the first project focused on company specific issues and no overall industry position was developed.

The second study identified the impact at a UK level of the future requirements for capital maintenance as a result of enhancement expenditure. Whilst a simplistic asset renewal rate was used the results show the ‘bow wave’ of future investment.
Impact of new regulations

Report Ref. No 03/RG/05/9

Summary (from introduction of report)

In preparing their business plans, water companies have applied their interpretation of the UKWIR Common Framework for Capital Maintenance Planning, which is based on a forward-looking view of the need for capital maintenance in order to maintain service to customers at least cost over time. As part of this framework, an historical analysis is required, to identify whether past spend has been adequate and to provide a benchmark against which forecast spend can be compared. Companies are expected to explain changes from past spending levels.

One of the most significant areas where the future is different to the past is the capital maintenance requirement of assets commissioned since privatisation. Many companies have made significant investment in enhancing their asset base to deliver improved performance standards, driven by a wide range of statutory obligations, over the past 15 years. As the assets age and start to need replacing, their impact on companies’ capital maintenance requirements will be significant. This assets are unlikely to have had a significant impact on either historic capital maintenance spend or the serviceability trends.

The framework methodology was developed to contribute to the application of the Common Framework by providing supporting evidence as to why the future period is different. This is recognised in the Common Framework:

− there is a need to consider the impact of differences between future and historical periods in estimating future CM needs, with particular regard to historical investment cycles and the requirements of large or unusual assets; the structure of this analysis is not well defined, and yet is critical if future service problems are to be averted.

The report details company specific examples, no overall industry data was available. There is a recognition that growth in the asset base could have a significant impact on future expenditure levels.
Impact of new regulations

Understanding the impact on shorter life assets on the longer term maintenance requirements of the UK Water Industry
Report Ref. No 12/RG/06/1

Summary

Water industry capital maintenance expenditure has more than doubled in real terms in the 20 years since privatisation. The report explores the reasons for increasing non-infrastructure capital maintenance requirements including growth in the asset base and an increase in the proportion of shorter life assets resulting in more frequent replacement cycles. The report also sets out to quantify at industry level historical expenditure by asset type and asset life category and then to forecast the impact of this historical investment on future maintenance requirements. The report shows that due to the nature of enhancement expenditure since privatisation the trend of increasing non-infrastructure capital maintenance requirements is expected to continue in future. Capital maintenance requirements are not expected to stabilise until a significant period after enhancement expenditure is ceased.

Charts A and C (see over) show modelled maintenance from 1989 to 2025 based on enhancement additions to the asset base from 1989-2010 for water and sewerage respectively. Charts B and D show total modelled maintenance against actual and planned maintenance.

Chart A shows that short and medium life assets have the greatest impact on future maintenance for water. Chart C shows that medium life assets have the greatest impact on future maintenance for sewerage. Charts B and D show that enhancement additions from 1989-2010 will have significant maintenance requirements over the next 15 years for both sewerage and water.

This work was not based on forward looking risk approach (aligning to Capital Maintenance Planning: A Common Framework) a simplistic asset age replacement life was used. However this does show the long term impact of new regulatory standards on base maintenance.
Charts A and C show modelled maintenance from 1989 to 2025 based on enhancement additions to the asset base from 1989-2010 for water and sewerage respectively.

Charts B and D show total modelled maintenance against actual and planned maintenance.

The long term impact of new regulatory standards on base maintenance is detailed below and shows an upward trend.
Generally, Ofwat and Companies have been aligned in the amount of capital maintenance required to maintain serviceability for customers.

The proportion of capital maintenance has moved from 50% to 60%.
Impact of new regulations

Ofwat Data

Commonly know as the ‘barking dog’ chart

Trends in capital maintenance (England and Wales)

Water industry capital investment requirements have increased considerably over the last 30 years. The chart show the trends in capital maintenance since 1981.

During the 1980’s and 1990’s quality and other improvements made up more than 50% of the total expenditure. However, from AMP5 capital maintenance made up nearly 60% of total capital expenditure.

The increase in capital expenditure over the last 30 years can be attributed to several factors:

- An aging asset base (older assets may require more maintenance)
- Growth in population/supply (more assets require more maintenance)
- Growth in the asset base to meet more stringent standards for water and effluent quality
- Changes in construction costs (above/below RPI)
- Changes in asset life apportionment, particularly growing numbers of shorter assets (that need replacing more often)

Source: Ofwat – Future water and sewerage charges 2009-10. Final Determinations. Page 2 of 12/RG/06/1
“While incidents of sewer flooding in properties are relatively rare, few could deny that it is highly distressing. This must be especially so for those who suffer repeat incidents. And the harm to the environment should not be dismissed. That is why I have made these recommendations to encourage the work that is already being done to reduce the risks of sewer flooding.”

In the key recommendations of the Capital Maintenance Planning: A Common Framework was highlighted as an area where Ofwat should encourage and rely on companies judgements for 2009 and beyond.

The water industry has invested £39 billion pounds over the last 25 years in improving the sewerage system. The industry manages 624,200km of sewers. The Delivering 21st Century Drainage programme sponsored by Water UK has expenditure as a work stream which may quantify the future investment requirements.

No expenditure forecast were given in the NAO document.
Sewers

Recommendations relating to expenditure

Companies should develop a clearer understanding of the rate of deterioration of their sewerage network assets. The industry or individual companies could achieve this by instituting a long-term programme (over perhaps 25 years) of surveys of a selected sample of different types of sewer. Ofwat should consult on the benefits and costs of either an industry-wide initiative to research the rate of deterioration of sewers or a requirement for each company to include such a sample in its regular five-year asset inventory assessments. In the longer term, once there is a better understanding of the condition of these assets, Ofwat should place more reliance on this information in its assessment of the needs of the networks.

Each sewerage company needs to have a thorough risk-based understanding of its networks and the linkages between condition, performance and the likely impact of intervention options. The common framework provides a means by which each company can achieve such an understanding through a coherent and convincing forward plan. The importance of a successful implementation of the common framework to the industry, and ultimately to customers, should not be underestimated. Ofwat should continue to encourage each company to implement processes consistent with the common framework as quickly as possible. Ofwat should encourage companies by identifying where its judgements have been informed by robust early work by companies on implementing the common framework.

Full implementation of the common framework by each company at the 2009 review should enable them to make robust and convincing assessments of capital maintenance needs that can be largely relied upon by Ofwat when it sets price limits for 2010 and beyond. Ofwat should set out more good practice and give each company tailored feedback on weaknesses in their submissions. Companies can use this feedback to develop their understanding of what Ofwat expects of them in the years leading up to the 2009 review. Ofwat should also ensure that its process for reviewing company submissions is quality controlled and that the company reporters

Source: NAO Out of sight – Not out of mind. Published January 2004
Information Technology has become the ‘fifth’ service area of capital maintenance, with approximately 20% of maintenance expenditure being targeted in this area.

Increasing reliance on IT and its short cyclical replacement has become a significant part of the companies’ forward looking investment plans and will remain so.
The Common Framework and Justifying Investment in “Management and General” Asset Types

UKWIR Ref: 11/RG/05/31

Conclusions and Recommendations

It is clear that investment in M&G is considered to be significant by both water companies and the regulator yet there is a broad range of approaches to justifying investment which in some cases are inadequate.

Ofwat recognises the importance of M&G investment and is expecting companies to formulate well argued business plans which are based on evidence and which include problem definition, the consideration of a range of options, a demonstration that the proposed solution is the most cost-effective (or cost-beneficial) and a statement of the anticipated benefits.

The historical data shows there is an increasing trend of expenditure in this area.
Summary

Evidence indicates there will be increasing requirements for capital maintenance expenditure being driven by:

- New technology (IT)
- Advanced treatment processes
- Growth in the asset base

The introduction of the new Expenditure Framework replacing the Common Framework which now covers all expenditure planning still focuses on risk and a forward looking analysis, this approach aligns to the ISO standard.

ISO 55001 Asset Management standard requires companies to have strategic asset management plans (SAMP) and to understand asset and service risk.

In the past Ofwat has been a great supporter and has encouraged companies to advance their asset management capability. At PR14 Ofwat took a more historical approach in modelling expenditure, with little reference to the Common Framework.

The question is whether this approach is sustainable for the future or whether the PR19 methodology needs to evolve to take account of company specific risks and be forward looking?