

# Case Study 7

## Creating a Demand Management Training Approach

### Understanding the Client's Perspective

The client, one of the largest water companies in the UK, had identified a need to upskill their operational management population as a result of a number of incidents which had caused the regulatory bodies in the UK water industry to challenge the competence of their management team. The client already had a programme of externally delivered training programmes in progress for their operations control room staff and some of their field based water network technicians, working on their clean water network. This was a 3 module course, Water Network Baseline Training, which included the following:

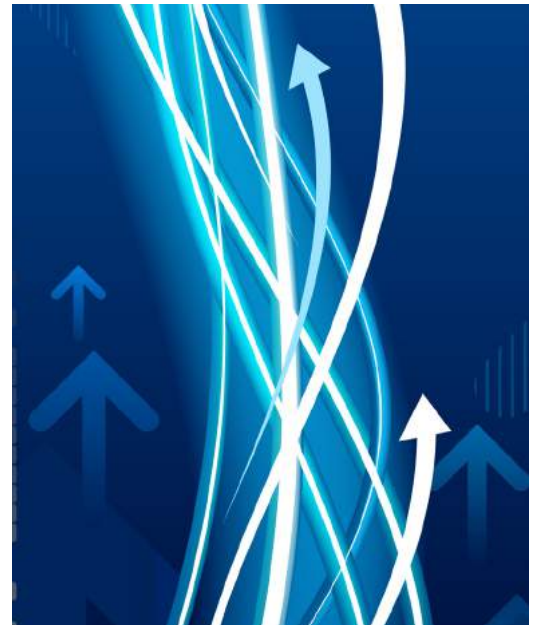
- Water Industry Awareness and the Regulatory Framework
- Water Network Components and Operation
- Leakage Management and Reduction

This was an informal and informative course which had no assessment or qualification attached to it. The course was designed to bring all identified field staff to a consistent level of competence and understanding around the above topics. Learners' understanding was checked by a Q&A session at the end of each module, however scores were not recorded and it was left to the individual learner to self assess where they needed to review and refine their understanding of the content. Learners would use the skills and knowledge acquired to demonstrate competence via an externally verified OPQ assessment at some point in the near future.

To satisfy the regulators, however, the client needed to raise the level of technical and decision making support content of this course so that managers were equipped with both the basic knowledge of network operations, components, and specifically leakage, and also the higher level of knowledge required to make appropriate decisions and interventions at a managerial level. The Level 5 Understanding and Management of Water Networks Award and Certificate were therefore procured by the client, to be delivered by L&DA and verified by an external awarding body, ProQual. The course consisted of multiple modules, each with defined learning outcomes and assessment criteria. One of the modules was based around the client's leakage management processes, and extended to include a study of other factors which made up the company's management of demand for drinking water.

### Developing the Course Framework

As an associate consultant with L&DA, I was commissioned to design and develop the Demand Management module of the Level 5 Award and Certificate in Water Network Management. The previous client's Baseline Training Course in Water Networks already contained a 2 day module on Leakage which had been developed in conjunction with the client's water network and leakage management team. However, it was clear at the outset that the Level 5 qualification would need to contain a significantly higher level of detail, technical and financial content, and managerial challenge for the learners embarking on this area of study, when compared with the Baseline Training material. The Baseline Training did,



however, provide a suitable framework on which to enhance and expand upon for the new qualification. At the outset, the scope of this module was exclusively focussed on the management of leakage. The client later requested to expand the scope to include other components of water demand and their management, but still keeping the timescale to a 2 day delivery.

The first step was to create the structure and framework of the 2 day delivery which involved the creation of a lesson plan (attached as Appendix A). At this stage, the plan was virtually exclusively focussed on the management of leakage with a reference to management of other components of demand; leakage being a major component of the water balance calculation. Each session of the course was described in the plan, with a brief content description, and the learning method to be adopted for each segment.

In a parallel process, 6 separate learning outcomes were developed which would demonstrate to the external qualification verifier, ProQual, that the course was sufficiently challenging to merit a Level 5 Award and Certificate. The 6 learning outcomes developed for this module were:

1. Articulate the reasons why demand management is critical to a water company's sustainability and the role leakage plays in the whole demand management strategy for the company
2. Critically evaluate the range of demand management options available including leakage management, progressive metering and water efficiency promotion
3. Develop a leakage management strategy with regard to short and long run economic levels of leakage and external influences on the strategy
4. Analyse data and define data requirements to be able to carry out leakage calculations in accordance with UKWIR / OFWAT code of practice for AMP7
5. Critically evaluate the main methods of leakage control and describe their relative effectiveness as part of an overall leakage reduction strategy
6. Explain and critically evaluate the appropriate methods of mains repair and maintenance and the options for managing this activity through contractors or direct labour

A key objective of the draft lesson plan was to ensure each of the learning outcomes was addressed, and that the assessments gave learners the opportunity to demonstrate that they had satisfied the objectives. The draft plan was submitted to the panel of Subject Matter Experts (SMEs) within the client and approval was sought to further develop the course material and assessment methods and questions to be put to the learners.

With some minor adjustments, including the requirement to expand the module from a leakage management module to one covering the wider demand management brief, the plan was accepted and the training material development could proceed.

## **Developing the Course Training Material**

Once the draft lesson plan had been approved by the client, the material and delivery methods were developed with the twin aims of satisfying the specific requirements of the client, and being able to demonstrate that the course was pitched at such a level that achievement of the learning outcomes could be demonstrated by the learners to satisfy the external verifier that a Level 5 qualification could be awarded. This meant that use of the existing Baseline Training material would have to be significantly enhanced to include more managerial and high level technical material, more financial aspects, and requiring the learners to critically evaluate existing the client practices to ensure they were still robust and relevant.

The key content of each session is described below.

### **Introduction to Demand Management**

This is the introductory session and gets learners to understand the components of demand and the importance of leakage as a component. Awareness of the OFWAT requirement for all water companies to produce a Water Resource Management Plan (WRMP) every 5 years is checked and learners are encouraged to become familiar

with the plan, and make the link between OFWAT leakage targets, company reputation and the WRMP. This is achieved by:

- Challenging learners to consider the factors which affect demand
- Understanding the stakeholders position with regard to leakage
- Understanding the financial consequences of failing the company's leakage target
- Being aware of the client's WRMP and the key aspects relating to demand management
- Understanding how the WRMP relates to the specific water resource zones set up by the client

## The Role of Water Efficiency in Demand Management

As well as reducing leakage, the WRMP details other demand management methods which will be employed by The client over the next 5 years. This session allows a critical interactive discussion within the group about key measures such as:

- Smart Metering
- Water Efficiency Devices
- Grey Water Recycling

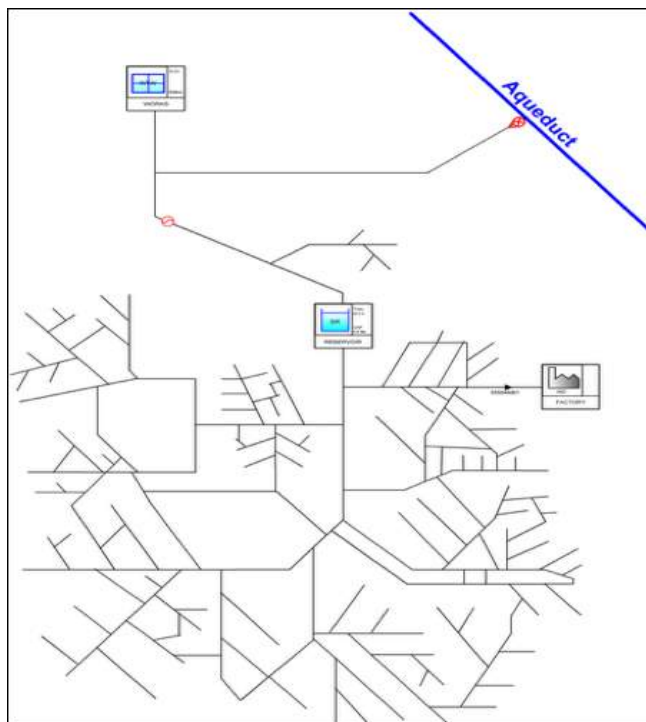
The relative merits of each are explored within the context of the WRMP

## The History of Leakage Management

This session aims to put current leakage management techniques within the context of the development of the UK water industry post privatisation. It examines how leakage management grew from being the poor relation of water network management to becoming one of the most important challenges the industry faces approaching AMP7. The session examines how the District Metered Area (DMA) became the building block for leakage management and ensures understanding by:

- Discussing current leakage performance in a historical context
- Discussing the impact of an aging network on leakage performance
- Allowing learners to design DMAs from a blank network and costing up their designs

Figure 1. A Blank Network Used for DMA Design Exercise

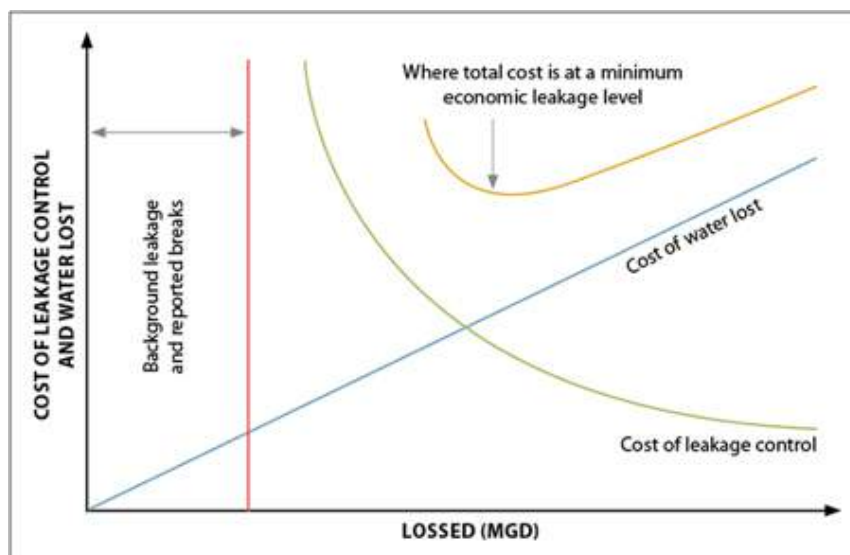


## The Economics of Leakage

This module introduces the concept of the Economic Level of Leakage (ELL) and describes how it can be evaluated and used in setting targets for leakage at a water resource zone level. On completion, learners will understand:

- The difference between short and long run ELL
- How leak detection and repair has diminishing returns
- How interventions in leakage management will affect the ELL
- The relationship between the marginal cost of water, the cost of repairing leaks and the long term cost of new resource development if leakage is not adequately managed

Figure 2. Understanding the Economic Level of Leakage



## Calculating Leakage

This module ensures learners fully understand the OFWAT methodology used by UK water companies to calculate and report their leakage figures. The method described follows that detailed in the UKWIR Consistency of Reporting Measures publication 2017 and uses the Top Down, Bottom Up, and Maximum Likelihood Estimation (MLE) method. On completion, learners will understand:

- Water balance approach for Top Down reporting
- Night line approach for Bottom Up reporting
- Minimising the gap to achieve a 5% MLE reconciliation
- The BABE model for estimating background losses
- Operability and its importance for accurate leakage calculation and reporting

The risk of mis-calculating and mis-reporting leakage to a company's regulatory position cannot be overstated and successful completion this module will give the client confidence that its managers are all compliant with the OFWAT methodology which is mandatory in AMP7

## Active Leakage Control (ALC)

Also known as leak detection and repair, or find and fix, this is one of the 3 main methods used by the water industry to reduce leakage. This module guides learners through the various traditional and innovative techniques for detecting leaks and logging them for repair. The module is largely tutor led but with opportunity to demonstrate basic equipment if available. Learners will gain understanding and be able to critically evaluate available techniques and:

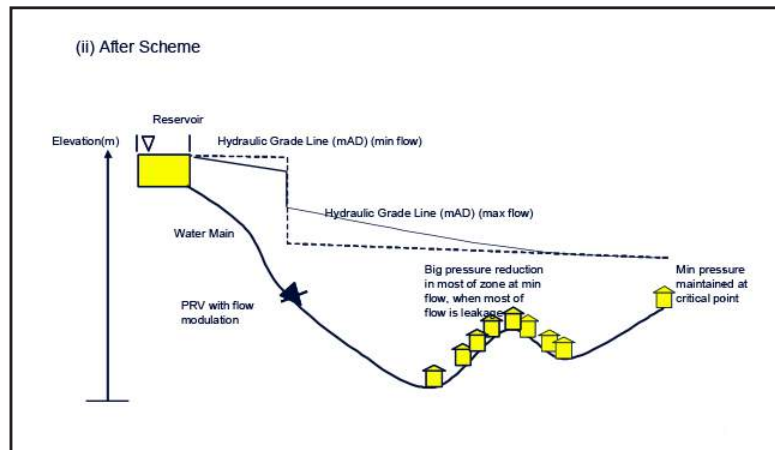
- How ALC sits within a balanced portfolio of leakage reduction methods
- Techniques being deployed and under development in the UK
- Detecting leaks outside of DMAs
- Leakage Management software employed by the client (Netbase)
- The client's approach to leakage campaign management (the 3 Rs; Reactive, Recovery, Reduction)

## Pressure Management

Arguably the most cost effective and efficient method of managing leakage, this module takes learners through the benefits and various techniques to manage pressure in the network. Learners have an opportunity to design a pressure management scheme and carry out a cost benefit analysis with an opportunity to analyse the results. The module will:

- Describe the workings of a Pressure Reducing Valve (PRV)
- Explain the various methods of controlling a PRV
- Explain the importance of a maintenance programme for PRVs
- Encourage learners to challenge the claimed leakage reduction benefits of completed PRV installations with the client to give confidence in the cost effectiveness of future schemes

Figure 3. Effects of Pressure Management on Hydraulic Gradient



## Mains Renewal

The most expensive and arguably the least effective method of controlling leakage. The client embarked on a large capital programme of Victorian Mains Replacement (VMR) projects in 2002, and accelerated the programme in 2006. This module describes the reasoning behind the programme but encourages learners to challenge and critically evaluate its effectiveness in reducing leakage.

## Assessment

In conjunction with the taught material described in Section 3 of this case study, a series of questions was developed with the twin aim of ensuring understanding of the material, but also providing sufficient challenge to the learners to demonstrate achievement of the learning outcomes at sufficient depth to gain the level 5 qualification. A question workbook was developed which followed the modules as described above and allowed the trainer to introduce the questions during the course in the context of the taught material, explaining the depth of answer required to demonstrate the required standard.



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