DEFINING THE NEED FOR UPM APPRAISAL AND SCOPING THE STUDY REQUIREMENTS

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1.0 Introduction

The paper explains the rationale behind the application of UPM methodology to catchments in the N W region together with the methods used to evaluate the scope of the UPM study required.

2.0 Background

Prior to the AMP 2 submission by North West Water Ltd more than 1000 Combined Sewer Overflows (CSO) were identified. in conjunction with the NRA, as unsatisfactory under the definitions contained in the Guidelines for AMP 2 Periodic Review. Version 2 (NRA. Dec 1993). Of these some 25% were programmed for resolution in the first quinquennium (Q1) 1995-2000. The capital expenditure required to solve these overflows is in excess of £200M.

In 1994 a review of the unsatisfactory overflow (UCSO) list for Q1 was undertaken on a Wastewater Treatment Works (WwTW) catchment basis. The aim of the review was to identify those catchments where the application of UPM methodology would either be a requirement due to the interaction of wastewater discharges. be needed to give added confidence in the accuracy of the solution and/or provide significant savings on capital investment.

Approximately 15% of the UCSO's to be resolved were those with a discharge to bathing beaches. In these cases solution development was at an advanced stage to ensure that work was completed on schedule to meet the EC Bathing Water Directive. Additional planning based on UPM methodology was therefore not appropriate. In addition to the bathing water UCSO's the Director General of OFWAT set North West Water a target of over 100 UCSO's to be resolved by March 1998. The projects identified to achieve this target were those where planning had started, the UCSO's were of the highest priority or where the application of the fully integrated UPM methodology was not appropriate.

Therefore it was clear that for the first quinquennium of AMP2, a fully integrated UPM approach could only be applied to catchments in which the overflows were to be programmed for resolution in 1998-2000.

3.0 Assessment of Need

The catchments with overflows which were to be resolved between 1998 and 2000 were subjected to a two stage review.

Stage 1 Assessment of Type of Watercourse and Significance of Discharge

This involved defining the type of watercourse under consideration and significance of the discharges in accordance with AMP 2 guidelines (NRA. Dec 1993). It considered. amongst other things, the reason(s) for the CSO's unsatisfactory designation, the volume and flows discharged

from UCSO's, flow rates in the watercourse, the impact on the watercourse of these discharges, amenity use, ability to model the watercourse and estimated cost of solutions. Reference was also made to Table 5.1 of the AMP 2 guidelines to identify the significance of the discharges to the watercourse and the indicative impact assessment criteria required to set consents.

From this review nine catchments were identified as suitable for an assessment following the UPM methodology. The catchments chosen contain 100 unsatisfactory CSO's, 5 wastewater treatment works with unsatisfactory inlet overflows and the same treatment works require additional works to improve treated effluent quality under the National Environmental Programme. The total capital expenditure required to resolve the problems is estimated to be in excess of £150 million.

Stage 2 Assessment of Catchments with Medium and High Significance Discharges

Those catchments containing medium and high significance discharges will require a more detailed impact assessment in order to clearly define the solution. In order to define the study requirements these catchments were reviewed in accordance with the UPM Manual. The first step in assessing the catchments was to obtain river data eg. levels, longitudinal sections, channel dimensions and flow and quality records. This information was used to identify the Derived Intermittent Standards for BOD and NH4 for each watercourse using Tables 3.3 and 3.4 of the UPM manual.

Additional information required at this point included existing verified network models, flow and quality information for WwTW and Formula A values for each CSO. Flows at each overflow were assessed using the hydraulic models to establish whether the overflow was passing forward Formula A at the time of discharge. This was considered the minimum performance requirement for an overflow. Where an overflow was not meeting this requirement adjustments to the model were made to either pass forward Formula A where the downstream system would accommodate the additional flow, or incorporate storage at the overflow to achieve equivalent performance.

A simple mass balance calculation was undertaken to obtain an indication of the likely BOD and NH4 values in the receiving watercourse for comparison with the values for the relevant Derived Intermittent Standard detailed in the UPM Manual. In some cases average BOD and NH4 for domestic sewerage was used calculate the loads contained in discharges and in others limited SIMPOL modelling was undertaken. If the concentrations were greater than allowable the spill volumes were reduced accordingly. The difference between the resulting final spill volumes and the existing spill volumes provided an indication of the required storage volume. Comparison of the required storage volume with that identified in completed Drainage Area Studies for the catchments indicated the potential benefits of the more accurate methodologies in the UPM procedure.

Undertaking this two stage review of the catchments also resulted in a detailed understanding of the problems in each catchment, an indication of the complexity of the study required in each case and indicative study costs.

4.0 Scoping the Study Requirements

Over a period of three consecutive days staff involved in the two stage assessment described in 3.0 above met to discuss each catchment in detail and identify the level of study required to assess the problems following UPM methodology. Representatives from WRc, who had been engaged to assist in interpreting

the UPM Manual in the context of the individual catchments, were also present at the meetings. At this stage the short timescale for implementation of the studies to allow construction between 1998 and 2000 meant that each study was assessed to be fully comprehensive as no better information was available at this stage.

The initial task involved defining the geographic areas to be investigated together with the elements of the river and wastewater systems which were to be considered during the study. Generally this identified the individual drainage areas to be investigated together with the associated river system receiving CSO discharges. Where appropriate the total catchment of the relevant Wastewater Treatment Works (WwTW) was identified as the study area.

Issues which would impact on the modelling, data collection and possible solutions within each study area were identified from data collected for the initial review together with local knowledge where available. A key aspect to this exercise was the range into which the river fell in Table 3.3 of the UPM Manual which indicated the level of river impact modelling required. The discussions produced a list of recommendations identifying the need for additional investigations, modelling of networks/treatment works/rivers and an overview of data collection requirements. The recommendations were presented to senior managers within North West Water for approval to proceed. which was given.

Following the approval to proceed the data collection requirements for each catchment was identified utilising the findings of the two stage review. This indicated the number of flow and/or quality monitors required and a general location point for each monitor, detailed locations ie. manhole, river bank, channel in WwTW were not specified at this time.

The NRA were informed of the catchments under consideration at an early stage. A formal presentation detailing the work to date and defining the study requirements in each catchment was given to the NRA for their approval. North West Water have continued to work closely with the NRA with respect to the UPM study programme and regular liaison meetings are held.

The study requirements identified during this exercise were used to produce a Scope Statement for each of the nine catchments. The Scope Statement defines the scope of work required in the specific areas of data collection, model build, model calibration and verification and solution development. They have subsequently been used in formulating a data collection programme and appointment of consultants to undertake the study work.