

The Use of FR0466 and Macro-Invertebrate Surveys to Identify uIDs

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Abstract

As part of the 1999 Periodic Review the Environment Agency proposed as national policy that all intermittent discharges found to be deficient after April 1999 would be regarded as new deficiencies. Consequently these unsatisfactory intermittent discharges (uIDs) would not be eligible for funding under a quality driver but would need to be remedied under base maintenance or supply/demand. This requirement has significant business implications for each of the water companies within England and Wales.

A major concern with this requirement was that at the start of AMP3 neither the North East Environment Agency (NE Agency) or Yorkshire Water Services Ltd (YWSL) had sufficient knowledge to identify specific discharges as deficient for a particular failure mode (i.e. either aesthetic or water quality). Both parties were aware that the identification of failures at AMP2 was flawed, resulting in the wrong number and types of deficiency, and that this situation was not unique to Yorkshire.

In order to minimise the above risks, YWSL have developed an innovative and robust procedure that can be used to determine the operational performance of outfalls within each Drainage Area Zone (DAZ). The process has been developed jointly with the NE Agency using nationally available software and procedures and utilises both aesthetic (FR0466) and macro-invertebrate surveys to identify uIDs.

To date YWSL have surveyed and classified approximately 1200 intermittent discharges (IDs) and have shown the methodology to be applicable in over 95% of cases.

By adopting the approach detailed in this paper YWSL are now in a strong position to meet the challenges of the AMP3 intermittent discharge programme as well as future regulatory requirements resulting from the Water Framework Directive.

1.0 Background

During the current AMP3 programme YWSL have an obligation to resolve the unsatisfactory operation of approximately 1100 intermittent discharges causing both aesthetic and water quality pollution in their receiving watercourses. The programme value of this work as allowed in the final determination is approximately £250 million.

As part of the Periodic Review the Environment Agency (EA) proposed as national policy that all intermittent discharges found to be deficient after April 1999 would be regarded as new deficiencies resulting from growth/new development, deterioration through lack of maintenance, or possibly through indirect effects of addressing levels of service such as DG5 flooding. Consequently these uIDs will not be eligible for funding under a quality driver but would be remedied under base maintenance or supply/demand. This requirement has significant implications not only for YWSL but also for all water companies in England and Wales.

A major concern was that at the start of AMP3 neither the NE Agency or YWSL had sufficient knowledge to identify specific discharges as deficient for a particular failure mode (i.e. either aesthetic or water quality). Both parties were aware that the identification of failures at AMP2 was flawed, resulting in the wrong number and types of deficiency. For instance, at AMP2 only 5 combined sewer overflows (CSOs) in 2 DAZs were categorised as water quality fails: the AMP3 estimate is approximately 270 CSOs in 105 DAZs.

In order to minimise the risks associated with the above and to target capital investment, Yorkshire Water in conjunction with the NE Agency have developed an innovative process for the identification of uIDs by use of FR0466 (a standard Foundation for Water Research method, as outlined in 2.2 below) and macro-invertebrate surveys.

The work represents the largest combined programme of FR0466 and macro-invertebrate surveys undertaken in the UK, the scale of the programme adding significant logistical problems to the challenge of designing a process from first principles.

2.0 The Process

The process adopted by YWSL to identify uIDs during the AMP3 period is detailed in figure 1.

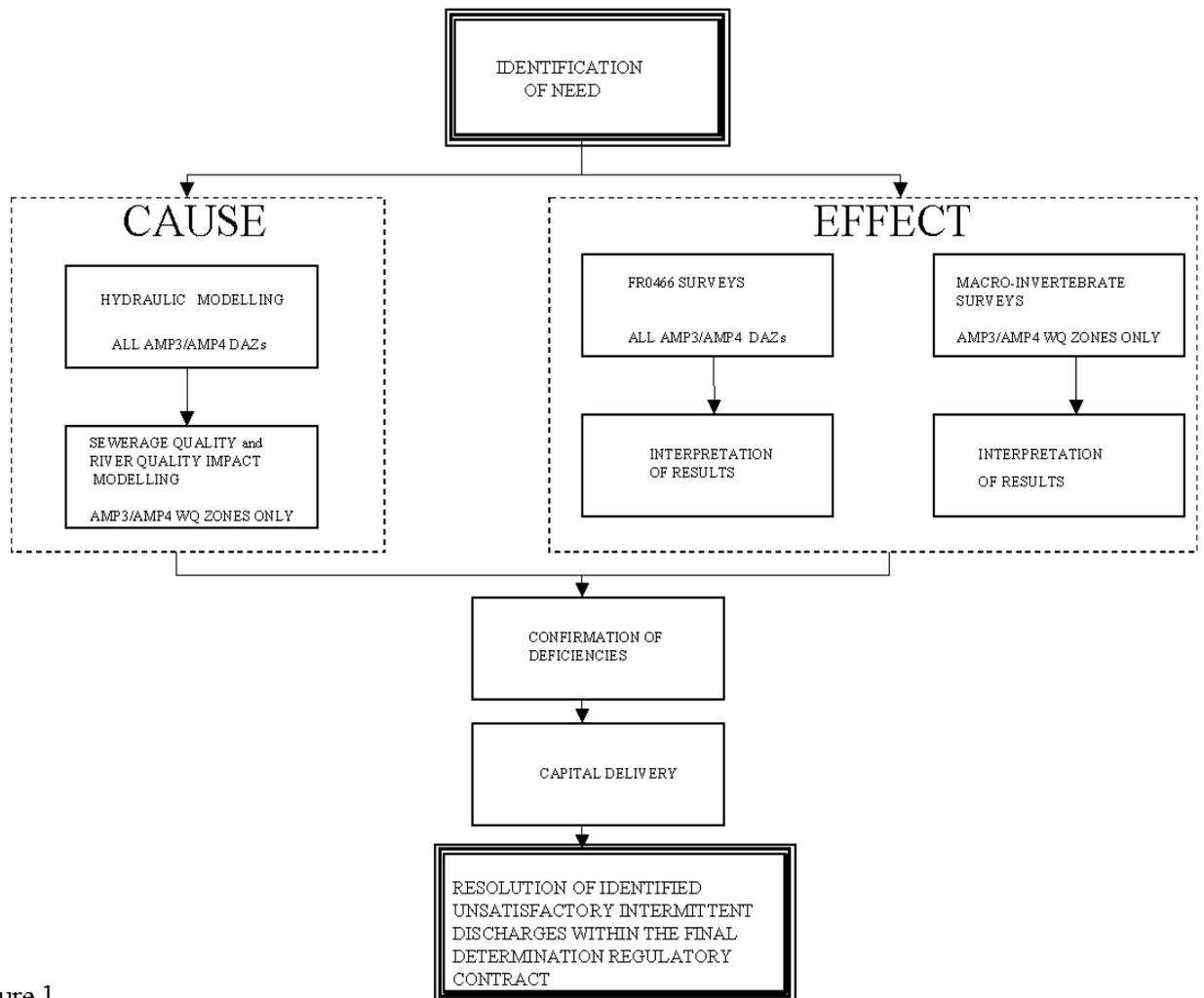


Figure 1

2.1 Macro-Invertebrate Surveys

Macro-Invertebrate surveys have been undertaken at each of the outfalls associated with the intermittent discharges within the DAZs identified by the NE Agency as containing water quality type deficiencies.

The process adopted by Yorkshire Water involves sampling the receiving watercourse both upstream and downstream of each outfall (where possible) so that a comparison between the upstream and downstream biological water quality can be made. Sampling was undertaken during three seasons - Spring (March to May), Summer (June to August) and Autumn (September to November). Once collected the samples were analysed by a team of expert biologists and the results recorded.

Quality assurance has been a major consideration in the development of the process and all surveys and laboratory analyses have been carried out in accordance with current EA guidelines and Quality Control procedures, including external audit by an accredited body.

The data collected were analysed using RIVPACS, the software utilised nationally by EA to monitor water quality via the Biological General Quality Assessment Scheme (GQA). The output from RIVPACS gives an indication of the GQA band associated with each receiving watercourse as well as a comparison between the upstream and downstream water quality grade for each outfall.

At the start of the project there was no procedure available which allowed an assessment of RIVPACS outputs to determine whether an outfall was responsible for causing a deterioration in water quality within the receiving watercourse. YWSL and EA have now developed a robust methodology which utilises RIVPACS data (supported by the local knowledge of EA Environmental Protection Officers and Ecologists) to identify which outfalls are having an impact within a water quality catchment. This methodology has been developed throughout the course of the project and has been applied successfully in over 95% of cases.

2.2 FR0466 Surveys

FR0466 surveys have been undertaken for every outfall associated with an intermittent discharge located within each of the DAZs to be addressed during the AMP3 and AMP4 periods.

All FR0466 surveys have been undertaken in accordance with FWR guide 'User Guide for Assessing the Impact of Combined Sewer Overflows'. The process involves undertaking surveys to count the amount of litter present both upstream and downstream of an outfall and also the outfall structure itself. A visual assessment of fungus and dry weather operation of the outfall is also made at this time. In addition to the field data, historical data (e.g. details of public complaints etc.) for each outfall are obtained from the EA and used to classify the CSO. In accordance with the FWR guidelines two field visits were made to each outfall structure

It was found that there are many instances where the FR0466 methodology cannot be applied and as a result of this, further investigations were undertaken by YWSL (e.g. water quality sampling to confirm the occurrence of dry weather operation) in order to obtain meaningful results for these outfalls.

Quality assurance has again played a major role in the development of these processes and 10% of all data collected is sent to an external organisation to be audited. As with the macro-invertebrate survey methodology, all outfall classifications are agreed with the NE Agency before they are finalised.

2.3 Confirmation of Deficiencies

When the outfall classifications ('effect') have been agreed with the Environment Agency they are compared with the results of the hydraulic and quality impact models ('cause') that are currently being constructed for each of the DAZs to be addressed during AMP3 and AMP4. This methodology, representing the critical stage of matching up cause and effect, is currently subject to final agreement between YWSL and the NE Agency.

3.0 Current Status

FR0466 and macro-invertebrate surveys for the outfalls within the DAZs to be addressed in AMP3 and AMP4 were commissioned in the summer of 1999. At the present time (November 2001) YWSL have undertaken 1534 FR0466 surveys and classified 1222 IDs. Macro-invertebrate surveys have been undertaken in the vicinity of 886 outfalls and the classification of 405 IDs has been agreed with the NE Agency.

The agreement of results for the remainder of the water quality catchments is ongoing and it is anticipated that macro-invertebrate survey results for all AMP3 zones will be complete and agreed with the EA by the end of December 2001. FR0466 surveys for all AMP3 zones are also on track for completion by the end of December 2001.

Capital delivery of the 1100 uIDs required by the Agency's National Environmental Programme schedule is underway and YWSL are confident that they will be able to resolve the identified deficiencies within the required timescales.

4.0 Conclusion

Yorkshire Water have developed an innovative and robust procedure that can be used to determine the operational performance of intermittent discharges. The process has been developed jointly with NE Agency using existing nationally recognised procedures and consequently there is a high degree of confidence in the results.

The methodology has not only minimised the risks associated with not identifying the correct uIDs, but has also allowed Yorkshire Water to target capital investment against the correct assets. This minimises the effects of sewage discharges on the environment and also addresses our customers' two highest priorities, namely to target investment through research and development and to reduce aesthetic pollution from sewage related debris.

By adopting the approach detailed in this paper Yorkshire Water are now in a strong position to meet the challenges of the AMP3 intermittent discharge programme as well as future regulatory requirements imposed by the Water Framework Directive. The Directive will introduce new challenges to the Water Industry, requiring both Industry and Regulators to understand the impacts of all discharges on the ecological status of receiving waters. The procedure developed by YWSL and NE Agency represents a significant step towards meeting this challenge.