

Alternatives to Dry Weather Flows in setting discharge consents

For many years flows to sewage treatment works (STWs) have been limited in consents as dry weather flow (DWF). The DWF is defined as the average flow over seven consecutive dry days following a period of seven days when rainfall does not exceed 0.25 mm in any one day. In the past treatment capacity at STWs was also based on DWF, but this has not been the case for many years. Design is now based on analysis of the different factors contributing to the sewage flow. DWF remains solely as a regulatory measure. It has been felt for some time that the measurement of DWF and regulation by Dry Weather Flow is not a very effective measure of flow control. The project was designed to quantify the perceived deficiencies of DWF and to propose and investigate alternative measurements for discharge flow regulation.

The project analysed daily flow data collected over several years from around 50 STWs. A number of serious defects of DWF have been quantified. It was found that in any one year there are normally only two or three periods when the weather conditions meet the DWF definition. Successive estimates of DWF usually varied considerably from each other. For instance, DWF measured in a dry February was very different from DWF measured in August. Because of these large variations it is only possible to prove that a discharge is exceeding the consented DWF when the limit is consistently exceeded over several years. Another disadvantage of DWF is the need to identify a raingauge that can be accepted as measuring rainfall in the sewer catchment. Several otherwise satisfactory flow datasets had to be rejected because a suitable raingauge record could not be identified. For these works it is not possible to monitor compliance with the DWF consent limit. For these and other reasons the report clearly identifies the defects of the current measure.

The project considered other flow parameters, which did not rely on monitoring additional parameters, such as rainfall. The three flow parameters selected for further consideration were annual mean daily flow, annual median daily flow and 95% exceeded annual flow. These represented parametric and non-parametric central values and a low extreme value analogous to DWF. They were examined, inter alia, for consistency between years, sensitivity to missing data and wet and dry years, robustness of use for consent calculation and links to STW design flows. All three parameters were considerably better than DWF in meeting the project objectives for an ideal measure. On balance it was considered that annual mean daily flow had the best fit to the project objectives and the report proposes this measure as a substitute for DWF in discharge consents. One of the deciding factors is that the mean daily flow figure is used directly in discharge consent quality modelling. It is therefore directly linked to quality requirements without discharge specific conversions.

The project was undertaken jointly with SEPA. They are in agreement with the Agency about implementing the report's proposals. It is suggested that the report is presented as a joint proposal to the water service companies and the Scottish water authorities to discuss implementation.

This R&D Technical Summary relates to information from R&D Project P2-009 in the following output:

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Copies of the Technical Report are available internally from the Regional Information Centre (Library) or the Project Manager and externally from the Environment Agency R&D Dissemination Centre, c/o Water Research Council, Frankland Rd, Blagrove, Swindon, Wiltshire SN5 8YF Tel 01793 865138 Fax 01793 514562.

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