

**SURFACE WATER DISCHARGE**

**Aim** *The continuous recording of stream or river water discharge at selected sites.*

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**Rationale** The impact of environmental change is likely to bring about a response in hydrological conditions at a site. The water balance at any location is controlled by climate, vegetation cover and soil properties. Any change in the external climate or in the internal structure of the soil-vegetation system of a catchment will be reflected in changes in site hydrology. This may involve changes in evaporation, in soil moisture levels, and in the amount of run-off from the site. Surface water discharge is an important component of catchment hydrology and at relatively pristine sites may provide a sensitive indicator of environmental change. At other sites, extraction of water from and discharges to rivers will affect flow but at all sites flow is an essential measurement in the calculation of changes in loads of nutrient elements and pollutants from catchments.

**Method** **Equipment**

The measurement of flow in rivers will be carried out using a permanently installed control structure or suitable velocity area method.

**Location**

The complete installation comprises an approach channel, a measuring structure, and a downstream channel. The condition of each of these three components affects the overall accuracy of the measurements. In selecting a suitable river section particular attention should be paid to the following:

- the adequacy of length of channel of regular cross-section available;
- the regularity of the velocity distribution over the cross-section of the approach channel;
- the avoidance of a steep channel if possible;
- the effects of any increased water levels upstream due to the structure;
- the impermeability of the ground into which the structure is to be founded;
- the necessity for flood banks to contain the maximum discharge to the channel;
- the stability of the channel downstream of the structure.

Full details are available in BS 3680 (BSI,1965).

**Operation**

The operation of the measuring section will conform with BS 3680. A digital logger will record stage (in metres) and flow (in cumecs), preferably at 15-minute intervals but at not less than 30-minute intervals. Data quality control will be carried out by site staff in accordance with the British Standard. The results of all checks (calibrations, changes and maintenance) recorded at the measuring section will be sent to the CCU for inclusion in the ECN database where appropriate.

**Authors** *T. P. Burt, R. C. Johnston, R. Owen*

**Reference** **British Standards Institution.** 1965. *BS 3680. Methods of measurement of liquid flow in open channels. Part 3. Stream flow measurements.* London: BSI.

## Specification of results and recording conventions

The measurement variables listed below are those required for each FWD sampling location at an ECN Site. Sites submitting data to the ECNCCU should refer to the accompanying Data Transfer documentation for the specification of ECN dataset formats, available on the restricted access Site Managers' extranet. Contact [ecnccu@ceh.ac.uk](mailto:ecnccu@ceh.ac.uk) if you need access to this documentation.

The first 4 key parameters uniquely identify a sample or recording occasion in space and time, and must be included within all datasets:

- [Site Identification Code](#) (e.g. R10) Unique code for each ECN Site
- [Core Measurement Code](#) (e.g. FWC) Unique code for each ECN 'core measurement'
- Location Code (e.g. 01) Each ECN Site allocates its own code to replicate sampling locations for each core measurement (e.g. FWC 01, FWC 02 for different surface water collection points)
- Sampling Date (/time) Date on which sample was collected or data recorded. This will include a time element where sampling is more frequent than daily

ECNCCU 2001

### Core measurement: Surface water discharge (FWD protocol)

The following variables are recorded automatically every 15 min at river sites.

Variable	Units	Precision of recording
Site identification code		
Core measurement code		
Location code		
Recording (Sampling) date		
Recording (Sampling) time	GMT 24-h clock	1 min
Stage (average)	M	0.001
Discharge (average)	m <sup>3</sup> S <sup>-1</sup> (cumecs)	0.001