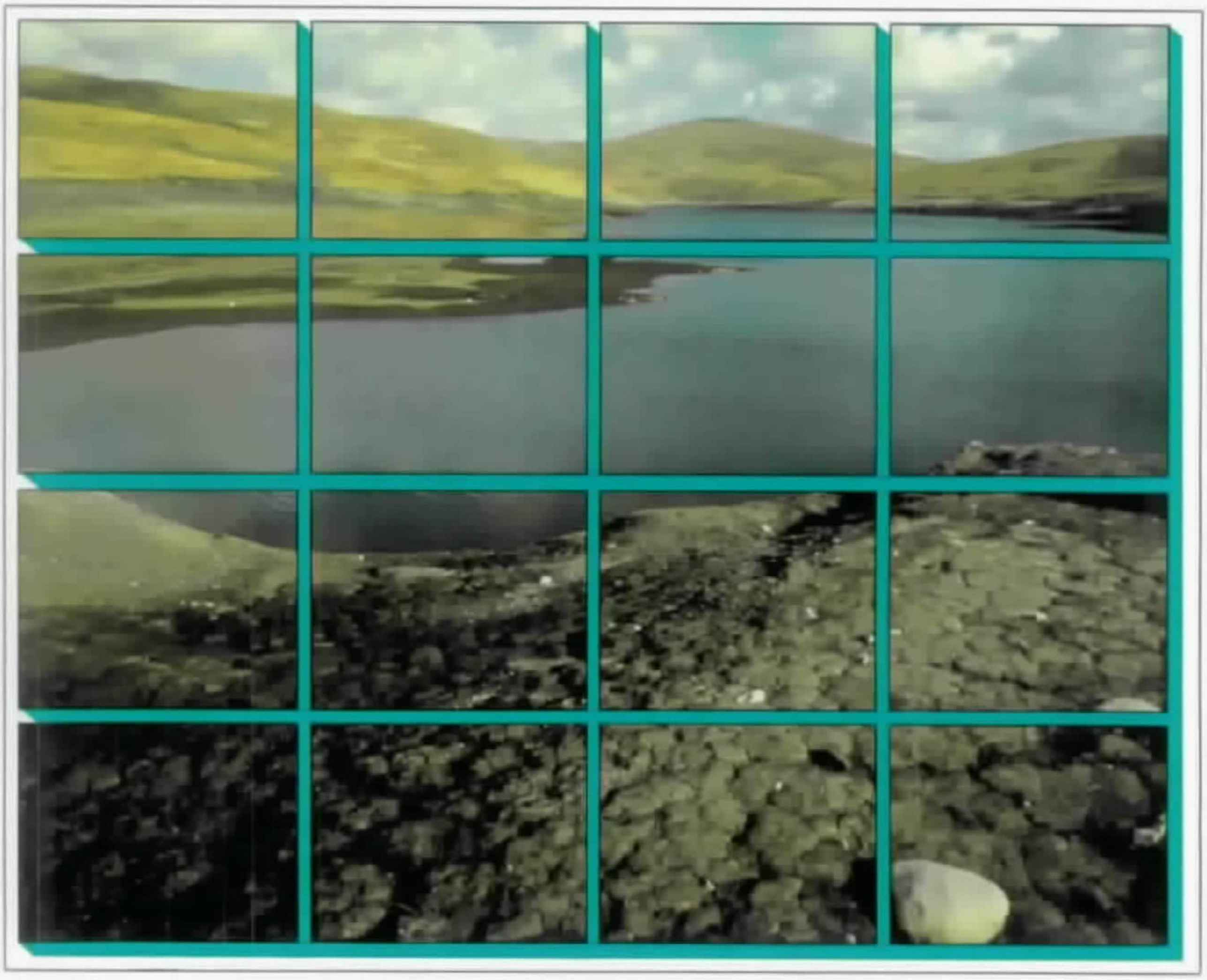
Institute of Hydrology

Report No. 108

Low flow estimation in the United Kingdom



Natural Environment Research Council

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Low flow estimation in the United Kingdom

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Preface

This report describes the techniques for calculating low flow statistics and catchment characteristics at gauging stations, and the development of methodologies for estimating low flow statistics at ungauged sites. The primary objective of the report is to provide national design techniques for estimating low river flow statistics at ungauged sites. The commissioned programme of work contained three principal areas of development:

1. To update low flow estimation procedures to benefit from extended data series and to include recent extreme events;

2. To analyse flow records in a manner that produces results which can be used by the water industry of the United Kingdom;

3. To investigate the feasibility of estimating low flow measures for a standard long period.

The work was commissioned by the Department of the Environment through Mr. C.E. Wright of the Water Directorate under research contract No. PE.CD/7/7/210, which also includes IH Report No. 107, 'Impact of climatic variability and change on river flow regimes in the UK', IH Report No. 115, 'Instream flow requirements of aquatic ecology in two British rivers' and reports to DoE describing the development of the 1989 drought. The opinions expressed are those of the authors and are not necessarily those of the Department.

In parallel with the development of methodologies for estimating low flow statistics funded by the Department of the Environment, the Institute of Hydrology has developed the MICRO LOW FLOWS software package for the automatic calculation of catchment characteristics and application of the low flow estimation methodologies.

Acknowledgements

The authors are grateful for the considerable support given to the project by the National Rivers Authority in England and Wales, the Purification Boards in Scotland, and the Department of the Environment (Northern Ireland), both for the advice on the quality of the records and for providing the flow data without which this study would not have been possible. Additional material has been provided by various research bodies and public undertakings. We would also like to thank the National Water Archive based at the Institute for providing access to the streamflow data. The HOST (Hydrology of Soil Types) project provided a key data base for regionalising low flows and the authors would like to acknowledge the project group of David Boorman (Institute of Hydrology), John Hollis (Soil Survey and Land Resources Centre), Alan Lilly (Macaulay Land Use Research Institute) and Jim Cruickshank (Department of Agriculture Northern Ireland). Rob Brown who assisted with the data assessment and Ros Gross, who assisted with regionalising low flow frequency curves, also provided an important contribution to the project. Finally, we would like to thank Colin Wright from the Department of Environment whose interest and advice at various stages of the project is much appreciated.

Executive Summary

This report contains procedures for the calculation of low flow measures from observed data and for their estimation at ungauged locations throughout the United Kingdom and is a successor to the Low Flow Studies report (Institute of Hydrology, 1980). There are four principal improvements in the hydrological data base available to this report which benefit the updated estimation procedures; (1) more gauging stations; (2) most gauging stations possess extended data series; (3) the extended data series include recent extreme drought events, in particular 1975/76, 1984 and 1989; (4) data from Northern Ireland are analysed.

All time series of daily river flow data on the National River Flow Archive have been graded in relation to their hydrometric quality and degree of artificial influence at low flows (Chapter 2). All grades have been verified by measuring authorities in the United Kingdom. Low flow grades and periods of record usable for low flow analysis are presented in Appendix 1. Methods for the calculation of low flow measures from gauged flow data are described, particularly the mean flow, Base Flow Index, flow duration curve and low flow frequency. The methods described have been applied to all gauging stations with usable periods of data and calculated values of low flow statistics and catchment characteristics (Chapter 3) are presented in Appendices 2 and 3 respectively.

Relationships are developed (Chapter 4) between catchment characteristics and flow statistics, specifically the mean flow and two key low flow statistics, Q95(1), the 95 percentile from the 1 day flow duration curve, and MAM(7), the mean annual 7 day minimum, representing the flow duration and low flow frequency measures respectively. This work has been significantly advanced by improvements in digital cartography enabling automatic derivation of catchment characteristics by overlaying digitised catchment boundaries on thematic data bases. The use of a provisional HOST (Hydrology of Soil Types) classification is a principal development within this report, replacing the prior requirement to define local relationships between catchment geology and the Base Flow Index. Twelve different Low Flow HOST Groups have been identified from the 29 HOST units with the addition of URBAN and LAKE. The proportion of the catchment area in each of these Groups has been derived for 865 gauged catchments in the United Kingdom and related to Q95(1) and MAM(7). This has enabled parameter estimates to be derived for each statistic for the twelve Low Flow HOST Groups. The following table summarises this analysis.

Low Flow HOST Groups	Q95(1) Parameter	MAM(7) Parameter
LFHG1	40.8	50.8
LFHG2	31.9	40.3
LFHG3	65.7	71.3
LFHG4	25.0	27.5
LFHG5	49.0	53.4
LFHG6	6.5	1.4
LFHG7	10.7	12.4
LFHG8	1.1	0.1
LFHG9	15.0	14.4
LFHG10	6.8	5.9
LFHG11	29.4	33.8
LFHG12	65.1	49.6

The two key statistics can be calculated at ungauged sites by calculating the fractions of Low Flow Groups from the different soil association units shown on published maps and using weighted parameter estimates (Appendix 4).

The development of internal relationships between Q95(1) and other flow duration percentiles and between MAM(7) and other frequency statistics (Chapter 5) enable the construction of flow duration and low flow frequency curves at ungauged sites. Other internal relationships allow the construction of frequency curves of annual minima of different durations (Appendix 5). Procedures for the incorporation of local data are presented (Chapter 6) and the sequence of steps in the estimation procedure is summarised, with guidance according to data availability at, or adjacent to, the ungauged site (Chapter 7).

The primary achievements of the project have been the assessment of hydrometric quality and degree of artificial influence at low flows of the UK flow archive, the application of advances in digital cartography to regional hydrology and the improvements in the ease and accuracy of low flow estimation at the ungauged site. This has been underpinned by the provisional HOST database which is a key variable in estimating low flows at ungauged sites. A number of recommendations for future research activities and hydrological data bases arising from this report are presented in Chapter 8. The most important of these is to update the estimation procedure when the final HOST data set is available, to explore the opportunities that further analysis at a finer spatial resolution of HOST will provide, to derive national standard period low flow statistics (Appendix 6), and to identify the most appropriate distribution and fitting techniques for single station and regional annual minimum distributions.

Contents

List of symbols and abbreviations

AMP(D)	annual D-day minimum flow of probability of exceedance P
AREA	catchment area, km^2
AARD	average annual runoff depth, mm
BFI	Base Flow Index
CV	coefficient of variation
DOE	Department of the Environment
DOE(NI)	Department of the Environment, Northern Ireland
EP	effective precipitation, mm
FALAKE	proportion of catchment covered by lake or reservoir
FDC	flow duration curve
FFC	flow frequency curve
f.s.e	factorial standard error
GRADMAM	Gradient of duration relationship in low flow frequency
HOST	Hydrology of Soil Types
IH	Institute of Hydrology
LOSSES	difference between SAAR and AARD, mm
MAM(D)	mean annual D-day minimum flow
MAM(7)	mean annual 7-day minimum flow
MEANFLOW(MF)	Mean flow, $m^3\ sec^{-1}$
MLURI	Macaulay Land Use Research Institute
MORECS	Meteorological Office Rainfall and Evaporation Calculation System
NERC	Natural Environment Research Council
NRA	National Rivers Authority
P	Exceedance probability
PE	potential evaporation, mm
Q95(1)	95 percentile 1-day flow
r	ratio of losses to potential evaporation
R^2	percentage of variance explained
RPB	River Purification Board
SAAR	standard period (1941-70) average annual rainfall, mm
SDL	standard deviation of the logarithms
s.e.	standard error of the estimate
SI	sensitivity index
SPR	standard percentage runoff
SSLRC	Soil Survey and Land Research Centre
T	Return period
TC	Type Curve for flow duration or flow frequency
W	Reduced variate of Weibull distribution
WIS	Water Information System
WRAP	Winter Rain Acceptance Potential

1 Introduction

There are a variety of low flow measures which describe and quantify different properties of flow regimes and these have different applications in the water industry. Table 1.1 summarises these low flow measures, the regime property which they describe, the data employed in their calculation and their application.

Table 1.1 Summary of low flow measures

Low flow measure	Property described	Data employed	Application
Flow duration curve	Proportion of time a given flow is exceeded	Daily flows or flows averaged over several days, weeks or months	Licensing abstractions or effluents, hydropower General hydrological description
Flow frequency curve (annual minimum)	Proportion of years in which the mean discharge over a given duration is below a given magnitude	Annual minimum flow - daily or averaged over several days	Return period of drought Design of major schemes First step in some types of storage yield analysis
Low flow spells (duration of deficiency periods)	Frequency with which the flow remains continuously below a threshold for a given duration	Periods of low flows extracted from the hydrograph followed by a statistical analysis of durations	More complex water quality problems such as fisheries Amenity Navigation
Deficiency volumes	Frequency of requirement of a given volume of make-up water to maintain a threshold flow	As for spells except the analysis focuses on the volume below the threshold	Regulating reservoir design
Storage yield	Frequency of requirement for a given volume of storage to supply a given yield	Daily flows or flows averaged over several days or monthly flow	Preliminary storage yield design Review of yield from existing storage
Time to accumulate runoff volume	Time to accumulate a given volume of runoff with a given frequency of occurrence	Accumulated runoff volume starting at different points of the year	Probability of reservoir refill in drought conditions
Recession constant	Rate of decay of hydrograph	Daily flows during dry periods	Short term forecasting General hydrological description Hydrogeology studies

This report contains procedures for the calculation of two low flow measures (the flow duration and flow frequency curve) from observed data and for their estimation at ungauged locations throughout the United Kingdom and is a successor to the Low Flow Studies report (Institute of Hydrology, 1980) in which calculation and estimation techniques were published within three Reports, as summarised in Table 1.2.

Table 1.2 *Summary of contents of Low Flow Studies report*

Report No 1	Research report
Report No 2.1	Flow duration curve estimation manual
Report No 2.2	Flow frequency curve estimation manual
Report No 2.3	Runoff accumulation time: description and estimation manual
Report No 2.4	Seasonal flow duration curve estimation manual
Report No 3	Catchment characteristics estimation manual

There are many international references to techniques for estimating the low flow regime at an ungauged site, particularly by classifying catchments into physiographic types and transferring flow data between catchments in the same region. Examples include Simmers (1975) for New Zealand, Musiake et al. (1975) for Japan, Knisel (1963) for south central United States, Midgely (1967) for South Africa, Mitchell (1957) for Illinois USA, Hines (1975) for Arkansas USA, McMahon (1969) and Klaassen and Pilgrim (1975) for Australia, Toong Ah Tea (1985) in Malaysia, Yoon (1975) for Korea, Vladimirov (1966) for the USSR and Drayton *et al.* (1980) for Malawi. An estimation of low flows by correlation with neighbouring gauged catchment data is described in U.S. Geological Survey publications: in particular Riggs (1973), Wesche *et al.* (1973) and Skelton (1974) make use of the cross-sectional properties of streams for flow prediction.

In Europe, studies include those of Martin and Cunnane (1976) in Ireland, Weyer and Karrenburg (1970), Lundquist and Krokli (1985) in Norway, and Gustard *et al.* (1989) in northern and western Europe.

In addition to the Low Flow Studies report, studies of low flows in the United Kingdom include that of Wright (1970). A series of regional estimation procedures (Table 1.3) have been developed in the United Kingdom following the Low Flow Studies (1980) procedures.

More recently techniques have been developed in the USA for estimating 7 day, 2 and 10 year return period annual minimum discharge in Indiana (Arihood and Glatfelter, 1986) and in Virginia (Hayes, 1991). As a contribution to the national drought atlas of the USA an analysis of the magnitude and frequency of streamflows using a data base of 1666 stations is being carried out (Thomas & Olson, 1992). Many of the low flow variables developed in the 1980 Low Flow Studies report have been regionalised in New South Wales and Victoria (Nathan and McMahon, 1991).

In addition, parameters of simple rainfall-runoff models have been derived for conversion of daily rainfall into monthly runoff.

Table 1.3 *A bibliography of regional low flow estimation procedures in the United Kingdom*

REPORT ON LOW FLOW STUDIES FOR THE SOUTHERN WATER AUTHORITY (1979) - Southern Water Authority

A STUDY OF LOW FLOWS IN THE SEVERN AND TRENT CATCHMENTS (1980) - Pirt J. and Douglas J.R.

A STUDY OF LOW FLOWS IN THE SEVERN AND TRENT CATCHMENTS - AN AMENDMENT (1982) - Pirt J. and Douglas J.R.

LOW FLOW ESTIMATION IN SCOTLAND (1987) - Gustard A., Marshall D.C.W. and Sutcliffe M.F.

LOW FLOW STUDY OF NORTHERN IRELAND (1986) - Gustard, A. and Sutcliffe, M.F.

AVERAGE AND LOW FLOW ESTIMATION IN THE NORTH WEST WATER REGION (1989) - Bullock A. and Gustard A.

AVERAGE AND LOW FLOW ESTIMATION IN THE SOUTH WEST WATER REGION (1989) - Bullock A., Gustard A., and Sekulin A.E.

National estimation procedures for ungauged sites are revised in this report. The revised techniques are based upon a larger hydrological data base, with extended data series, a larger number of flow records, and the inclusion of gauged flow data from Northern Ireland. The extended flow series include data from recent extreme low flow events. The Low Flow Studies report (1980) analysed data up to 1975, whereas data up to the end of 1989 are analysed in this report. Consequently, the extreme low flow events of 1975/76, 1984 and 1989 are included.

A comprehensive classification of the quality of low flow data at 1643 gauging stations in the United Kingdom has been completed in conjunction with the hydrometric authorities. This classification has assessed the hydrometric quality (Section 2.1.1) of recorded flow data and quantifies the degree of artificial influences upon low flows (Section 2.1.2). The classification has been used to select those periods of record (Section 2.1.3) and those catchments (Section 2.1.4) suitable for the calibration of regionalisation procedures. Application of this classification scheme selects 865 gauging stations as suitable for analysis. Individual years of poor quality flow data which do not fit into the overall classification scheme are considered in Section 2.1.5. Grades which classify the hydrometric quality and degree of artificial influences of the period of flow record at each gauging station are presented in Appendix 1. Section 2.2 compares the flow series analysed in this study with the flow series analysed in the Low Flow Studies report, and highlights the larger number of flow records, extended data series, wider geographical coverage and inclusion of recent extreme low flow events.

Chapter 3 describes the calculation of flow statistics and catchment characteristics for gauging stations. Low flow and mean flow statistics and catchment characteristics have been calculated for all gauging stations with suitable time series of gauged flow data. This report describes the methodologies for the calculation from gauged time series of the mean flow (Section 3.1.1), Base Flow Index (Section 3.1.2), flow duration (Section 3.1.3) and low flow frequency (Section 3.1.4) statistics.

In the development of the earlier 1980 Low Flow Studies report, catchment characteristics were calculated by manual procedures. In this study, catchment characteristics have been calculated by overlaying digitised catchment boundaries on to gridded thematic data bases. To achieve this, the boundaries of 865 catchments with good quality low flow data have been drawn, digitised and archived.

The 1980 Low Flow Studies report concluded that successful estimation at an ungauged site was found to depend very largely on the nature of the geology of the catchment. The Base Flow Index was developed for the purposes of quantifying catchment geology and that report advocated regional studies to describe how this index relates to, and may be estimated from, a knowledge of local geology. Although regional relationships were pivotal to the application of Low Flow Studies procedures at ungauged sites, such relationships were not widely developed by the water industry. The consequence of this was that the Low Flow Studies report estimation procedures were not widely adopted. This situation led, in part, to the development of regional low flow estimation procedures (Table 1.1).

A principal advance in the development of the estimation procedures in this report has been the application of the provisional Hydrology Of Soil Types (HOST) response classification. This classification related the physical properties of soil and geology mapping units to hydrological response. The current study has related the HOST classification to the low flow response of gauged catchments, providing the link between catchment geology and low flows at a national scale. The original HOST classification contains 31 different hydrological response classes, and this number has been reduced to twelve Low Flow HOST Groupings. This link between HOST and low flow response underpins the national low flow estimation procedure. It is anticipated that further improvements can be achieved by the development of more detailed relationships between HOST and low flow statistics using finer resolution HOST grids.

Methodologies for calculating values of catchment characteristics including catchment area, average annual rainfall, average annual potential evaporation and fractions of Low Flow HOST Groupings are presented in Section 3.2.

Section 3.3 describes the Low Flow Study data base that is used in developing low flow estimation procedures in this report. The calculated flow statistics for gauging stations with adequate quality flow data are presented in Appendix 2. Calculated catchment characteristics are presented in Appendix 3.

Chapter 4 describes the development of methodologies for the estimation of low flow statistics at ungauged sites. These are based on developing relationships between key low flow statistics and catchment characteristics. In developing these relationships the low flow statistics are standardised as a percentage of the long-term mean flow (MF). The methodology for the estimation of the mean flow (Section 4.1) is based on a revision of the water balance methodology described in the 1980 Low Flow Studies report. The development of procedures for the estimation of key flow duration statistics and low flow frequency statistics are described in Section 4.2. In both cases, proportions of Low Flow HOST Groupings within gauged catchments have been related to two key flow duration and low flow frequency statistics; Q95(1) and MAM(7). Following a review of low flow statistics applied by the water industry in the United Kingdom, these key statistics have been calculated in this report as Q95(1) and MAM(7), replacing Q95(10) and MAM(10) respectively which were analysed in the 1980 Low Flow Studies report.

Chapter 5 describes the development of procedures for the estimation of flow duration curves (Section 5.1), low flow (annual minimum) frequency curves based on minima of seven days duration and low flow frequency curves of D-day durations (Section 5.2). Unlike the Low Flow Studies report (1980) no analysis of duration relationships for the flow duration curve is carried out, following a review of low flow measures used by the United Kingdom water industry.

Procedures for the incorporation of local gauged data into the estimation procedure at ungauged sites are presented in Chapter 6.

Chapter 7 presents step-by-step procedures for the calculation and estimation of low flow measures at gauged and ungauged sites. Observed low flow statistics used in the calibration of estimation procedures in this report are calculated from 865 time series of flow data extending over different time periods. The calculated statistics are therefore period-of-record statistics. Arising from concerns of biased estimates of flow statistics from short records, Appendix 6 presents a feasibility study for the calculation of standard period statistics in which only a common period of flow data is analysed at each gauging station.

Chapter 8 draws conclusions from the analysis and makes recommendations for future research activities in the sphere of low flows in the United Kingdom.

2 Gauging station selection

The development of multivariate relationships between flow statistics and catchment characteristics has to be based on catchments with good quality data and relatively natural flow regimes. Section 2.1 describes a national low flow classification procedure based on a hydrometric classification (Section 2.1.1) and a degree of artificial influences classification (Section 2.1.2). Section 2.1.3 addresses the difficulty of multiple grades at a gauging station. Section 2.1.4 describes the results of the application of the classification procedure to 1643 gauging stations in the United Kingdom, and the number of stations within each category. Short-term anomalies in data which cannot be covered adequately by the national classification procedure are addressed in Section 2.1.5. Section 2.2 compares the number of stations used in this study and in the 1980 Low Flow Studies report in terms of total number and their distribution within hydrometric areas and administrative units.

2.1 NATIONAL LOW FLOW CLASSIFICATION PROCEDURE

2.1.1 Hydrometric quality classification

Sensitivity index

Both the sensitivity of a change in discharge to a change in level and the accuracy of the stage discharge relationship were assessed at Q95(1), the 95 percentile of the one day flow duration curve (Section 3.1.3).

The sensitivity of a gauging station is described by an index which defines the percentage change of Q95(1) represented by a +10mm stage variation above the Q95(1) stage. The calculation of the sensitivity index (SI) is illustrated in Figure 2.1.

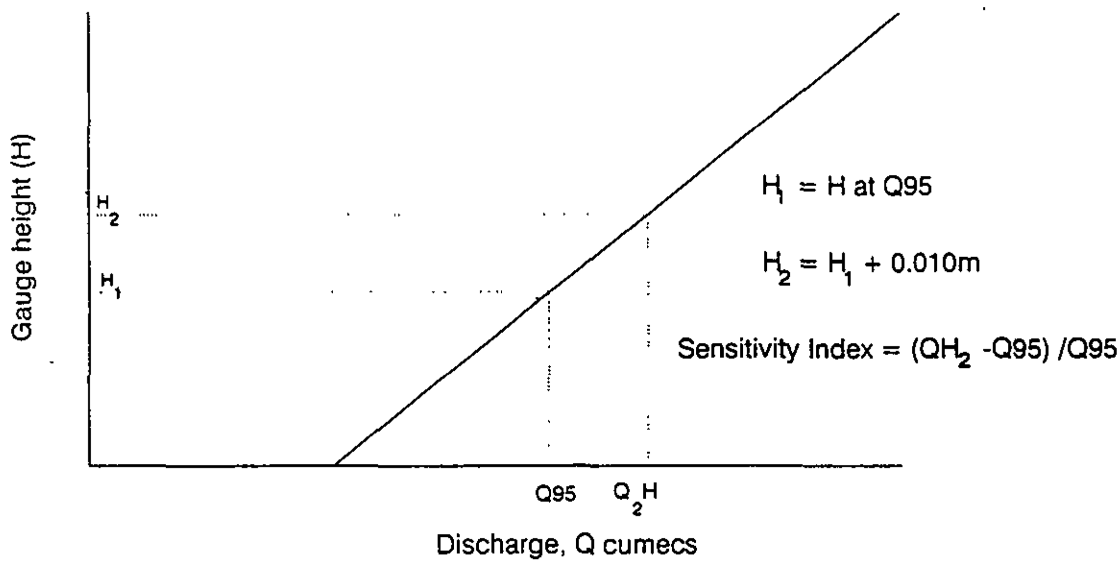


Figure 2.1 *Calculation of the Low Flow Sensitivity Index*

Factorial standard error of estimate
The accuracy of the stage/discharge curve is defined by one factorial standard error of the estimate (1 f.s.e.) at the Q95(1) stage, which statistically describes the scatter of check gaugings about the low flow discharge derived from the theoretical or empirical rating.

In only a few cases were the factorial standard error of estimates available from the regression analyses used to derive the stage-discharge curve. In most cases, graphical representations of the rating curves were available and an upper and lower envelope to the current meterings was assumed to represent 1 f.s.e. At purpose-built structures with no check gaugings available, the factorial standard error of estimate was based on an estimate of the probable error in deriving a gauged flow from the head. For these structures it was assumed (unless more detailed information was available) that the factorial standard error of estimate was 1.02.

2.1.2 Degree of artificial influences classification

River flows must approximate a natural response to the physical properties of the catchment if useful multivariate relationships are to be derived. It was therefore necessary to estimate the degree of artificial influences within each catchment. This was achieved by estimating the bias due to artificial influences upon the ratio between the natural Q95(1) and the natural mean flow. This index was used because in estimating low flows at ungauged sites the low flow statistics were standardised by the mean flow. Thus if there was no change in this ratio (because both the Q95(1) and mean flow were reduced by the same proportion) then the catchment was considered 'natural'. Essentially the assessment procedure identified those catchments with a biassed value of Q95(1) due to a nett loss (abstraction) or gain (effluent returns) to the catchment. This was calculated by the following method using gauged flows and artificial influence data.

The flow statistics Q95(1) and Mean Flow were calculated from all flow data on the National River Flow Archive, termed $Q95_g$ and MF_g respectively. Because they were calculated from gauged flow data $Q95_g$ and MF_g are artificially influenced, with the exception of natural catchments. To assess the degree of artificial influence, it was necessary to estimate Q95(1) and MF under natural conditions. This was achieved by an attempted naturalisation of the two statistics. Data were assembled on factors affecting flow regimes, in particular details of abstraction licences, consents to discharge, and reservoir yields and compensation flows. Maps were produced for each NRA region, plotting the location of principal abstractions, discharges and reservoirs, and identifying the location of each gauging station. The map was annotated with the maximum licensed abstraction rate (for all abstraction rates greater than 10 litres sec^{-1}), consented discharge (for all discharges greater than 10 litres sec^{-1}), reservoir yield and compensation flows for reservoirs exceeding capacity of 500 Ml. Information on abstraction licences and discharge consents were provided by the NRA-regions. The definitions of the maximum abstraction rates and consented discharges varied between the ten regions. Data on reservoir yields and compensation flows were extracted from Gustard *et al.* (1987).

For each gauging station the upstream totals of abstraction (ABS) and effluent return (RET) rates were calculated. In order to naturalise the gauged flow statistics, ABS was assigned a positive sign because abstractions represent an export from the catchment, and RET was assigned a negative value because returns represent an import into the catchment. A nett artificial influence (ARTINF) was calculated by adding RET to ABS, producing a positive value of ARTINF where there were nett abstractions from the catchment, and a negative value of ARTINF where there were nett returns into the catchment. $Q95_g$ and MF_g were naturalised by the addition of ARTINF, on the assumption that abstractions and discharges exert the same absolute modification to low flows as to the mean flow.

In catchments with reservoirs upstream, then MF_g was further naturalised by the inclusion of the long-term reliable yield, Y, which was included within the abstraction term, ABS, and then within ARTINF. $Q95_g$ was naturalised by accounting for the reservoir compensation flow (CF). This was achieved by calculating the difference between CF and an estimate of the natural Q95(1) at the reservoir site, Q95res. Q95res was calculated by multiplying the estimated natural mean flow at the reservoir site from Gustard *et al.* (1987) by 0.18, being the national average value of Q95(1) as a percentage of mean flow. The correction factor applied for $Q95_g$ was calculated from CF - Q95res.

The bias exerted by artificial influences was calculated by

$$BIAS = \frac{Q95_g}{MF_g} \times \frac{MF_g + ARTINF_{MF}}{Q95_g + ARTINF_{Q95}} \tag{2.1}$$

In non-reservoired catchments

$ARTINF_{MF} = ARTINF_{Q95} = (ABS + RET)$

In reservoired catchments

$ARTINF_{MF} = ABS + RET + Y$
$ARTINF_{Q95} = ABS + RET + (CF - Q95res)$

The magnitude of the bias remains small where abstractions and discharges occur within the catchment boundary, and becomes larger with increasing imports or exports of water. Catchments with a bias of between 0.8 and 1.2, that is the gauged Q95(1)/MF ratio differs by less than 20% from the estimated natural Q95(1)/MF ratio, were provisionally graded A for artificial influence. Catchments with a bias of between 0.5 and 0.8 or between 1.2 and 1.5 were provisionally graded B. Catchments with a bias of less than 0.5 or greater than 1.5 were provisionally graded C.

Limitations of this methodology are that:

i) all artificial influences are assumed to be considered, but in practice not all will have been included;

ii) information about artificial influences are authorised (licensed) amounts, whereas actual water use may be considerably lower but difficult to quantify;

iii) it is assumed that the balance of imports and exports is independent of time, whereas there will be some redistribution in time between abstracted water being returned as effluent returns;

iv) it is assumed that the impact of abstractions and returns can be equally applied to low flows and to the mean flow, which is unlikely in reality as abstractions tend to increase under low flow conditions.

Despite these limitations, however, the application of the methodology ensured that a consistent assessment procedure was applied to all catchments in England and Wales.

In order to address these limitations, and to identify anomalies in the calculation of the bias, staff of the ten regions of the National Rivers Authority considered the assigned grades by comparing all grades within each region. This led to the regrading of a number of catchments to take account of factors which had not been considered by the bias calculation including minewater discharges, overestimation of abstraction amounts caused by using licensed rather than actual amounts, the significance of mills, locks and canals, and variations in the magnitude of artificial influences over time.

The degree of artificial influences upon low flows in Scotland had been considered as part of an overall assessment of Scottish gauging stations which combined hydrometry and influences within a single grade (Gustard *et al.*, 1987). This information was reassessed in conjunction with maps depicting the principal hydro-electric power schemes to produce a separate hydrometric and degree of artificial influence grade, consistent with the scheme applied in England and Wales. These were submitted to staff of the seven regional River Purification Boards for consideration and amendment.

Maps of water resource schemes in Northern Ireland and station descriptions from the National Water Archive were interpreted to provisionally classify gauging stations in Northern Ireland. These grades were considered and amended by staff of the Department of the Environment (NI).

The criteria used for classifying gauging stations according to hydrometric quality at low flows and the degree of artificial influences are summarised in Table 2.1.

2.1.3 Multiple grades at a gauging station

Many gauging stations have experienced changes either in hydrometric quality or degree of artificial influence or both. In the case of formal hydraulic structures, many have been upgraded to improved structure design during the course of their data collection history. In the case of control reaches without a formal hydraulic control, changes in rating curves can result from changes in the nature of the downstream control; such changes can be frequent and occur annually, where riffle controls adjust to winter flood events, or they may be less frequent due to alterations in other channel controls. Where formal hydraulic structures have been reconstructed, then both phases of the hydrometric quality are assessed and graded. This can result in the assignment to a single gauging station of different hydrometric quality grades for different data periods. Where changes in rating curves are more frequent, then the indices of hydrometric quality were calculated for the rating which was applicable for the longest data period, except in the case of very frequent changes in which case the most recently available rating was assessed. The identification of a distinct phase during which hydrometric quality deteriorated at a gauging station consequent upon factors such as siltation, weed growth or vandalism led to the assignment of lower grades during those phases.

Significant changes in the degree of artificial influences within data periods are attributed only to the inception of large scale water resource schemes rather than to trends in water use by smaller abstractors. Artificial influence grades were calculated for gauging stations possessing before and after phases allied to reservoir construction or commencement of inter-basin transfer schemes.

Table 2.1 *Classification scheme for low flow suitability grading*

Classification of hydrometric quality

GRADE A

Accurate low flow measurement over a sensitive control (Sensitivity index, SI less than 20%) with the scatter of spot gaugings about the rating curve at the Q95(1) discharge having a factorial standard error of estimate of less than 1.1, and no obvious deterioration of the gauging station due to siltation, weed growth or vandalism.

GRADE B

Less accurate low flow measurement with either a less sensitive control (SI between 20% and 50%) or a factorial standard error of estimate of between 1.1 and 1.2, and/or observed periodic deterioration of the gauging station due to siltation, weed growth or vandalism.

GRADE C

Station with low accuracy of low flow measurement due to either an insensitive control (SI in excess of 50%), and/or with the scatter of gaugings about the rating curve at the Q95(1) discharge having a factorial standard error of estimate in excess of 1.2, and/or observation of sustained deterioration of the gauging station due to siltation, weed growth or vandalism.

GRADE U Unclassifiable due to insufficient information.

Classification of degree of artificial influence

GRADE A

The gauged Q95(1)/mean flow ratio differs by less than 20% from the estimated natural Q95(1)/mean flow ratio.

GRADE B

The gauged Q95(1)/mean flow ratio differs by more than 20% but less than 50% from the estimated Q95(1)/mean flow ratio.

GRADE C

The gauged Q95(1)/mean flow ratio differs by more than 50% from the estimated Q95(1)/mean flow ratio.

GRADE U Unclassifiable due to insufficient information.

2.1.4 Results of national classification of low flow data quality

A total of 1643 gauging stations were assessed, of which 1366 were classified and their grades, and the periods to which the grades apply, are presented in Appendix 1.
A total of 277 remain unclassified (Table 2.2) because i) the stations do not possess processed flow data on the National River Flow Archive (coded as Z in Appendix 1), ii) the stations are individual structure components of a composite flow record elsewhere in the archive (coded as C), iii) the stations are only partially rated, with good low flow measurement but poor measurement of the mean flow (coded as P) or iv) the stations measuring spring flows where the topographic and groundwater catchments differ significantly (coded as S).

Table 2.2 *Status of classified and non-classified gauging stations on the National River Flow Archive*

TOTAL NUMBER OF STATIONS ASSESSED	:	1643
Number of gauging stations classified (with data on the National River Flow Archive)	:	1366
Number of gauging stations without data on National River Flow Archive	:	233
Number of composite gauging stations	:	26
Number of partial gauging stations	:	11
Number of spring gauging stations	:	15

Table 2.3 summarises the assignment of stations to different grades amongst the 1366 classified stations, and Table 2.4 summarises the combined grades.

For the purposes of this study, gauging stations graded as AA are defined as pristine, and the set of gauging stations graded as AA, AB, BA and BB are defined as usable. A total of 490 gauging stations are defined as pristine and a total of 865 as usable. Only data from these gauging stations are analysed in this report. Subsequent criteria of record length and missing data are applied at a later stage.

The spatial distribution of the usable gauging stations (graded AA, AB, BA, BB) is presented in Figure 2.2. The catchments above the usable gauging stations are presented in Figure 2.3.

Table 2.3 *Number of stations with grades describing hydrometric quality and degree of artificial influences*

	Hydrometric grade	Artificial influence grade
A	950	646
B	298	278
C	118	442
Total	1366	1366

Table 2.4 *Number of stations with combined grades*

Combined grades		Number of stations
AA	865	490
AB		192
BA		119
BB		64
CA		37
AC		268
CB		22
BC		115
CC		59
		Total 1366

Note that: hydrometric quality grade is presented first, followed by grade reflecting degree of artificial influences

Note that: where a gauging station has multiple grades, then the highest grading only is considered in this tabulation

2.1.5 Short-term anomalies at a gauging station

Periodic short-term events at a gauging station or within the upstream catchment can render spells of data as unsuitable for low flow analysis. Such events can include intermittent failure to control weed growth, or the temporary operation of water resource schemes during testing. Short-term events do not warrant an overall downgrading of the station grade, but mean that the year containing the event should be considered as unsuitable for analysis, especially if the event occurs during a low flow period, because the annual minimum characteristics for that year cannot be ascertained. A maximum of two individual years could be identified and omitted from each flow data series, without consideration being given to the downgrading of a data period. The omitted years are listed as OMIT1 and OMIT2 in Appendix 1.

Figure 2.4 illustrates examples of short-term anomalies in annual hydrographs from the Anglian region. Figure 2.4a illustrates the impact of the operation of upstream sluices upon July and August flows in 1983 at Bramford Mill gauging station on the River Gipping. Figure 2.4b illustrates the effect of the operation of the Waveney groundwater scheme upon flows between May and September 1976 at Oakley Park on the River Dove. Figure 2.4c shows weed growth effects upon the June/July and September to November flows in 1975 at Warham on the River Stiffkey. The occurrence of each of these examples was restricted to a single year or to a short period in the flow record. In each case, the natural low flow regime is obscured, and in particular the annual minimum.

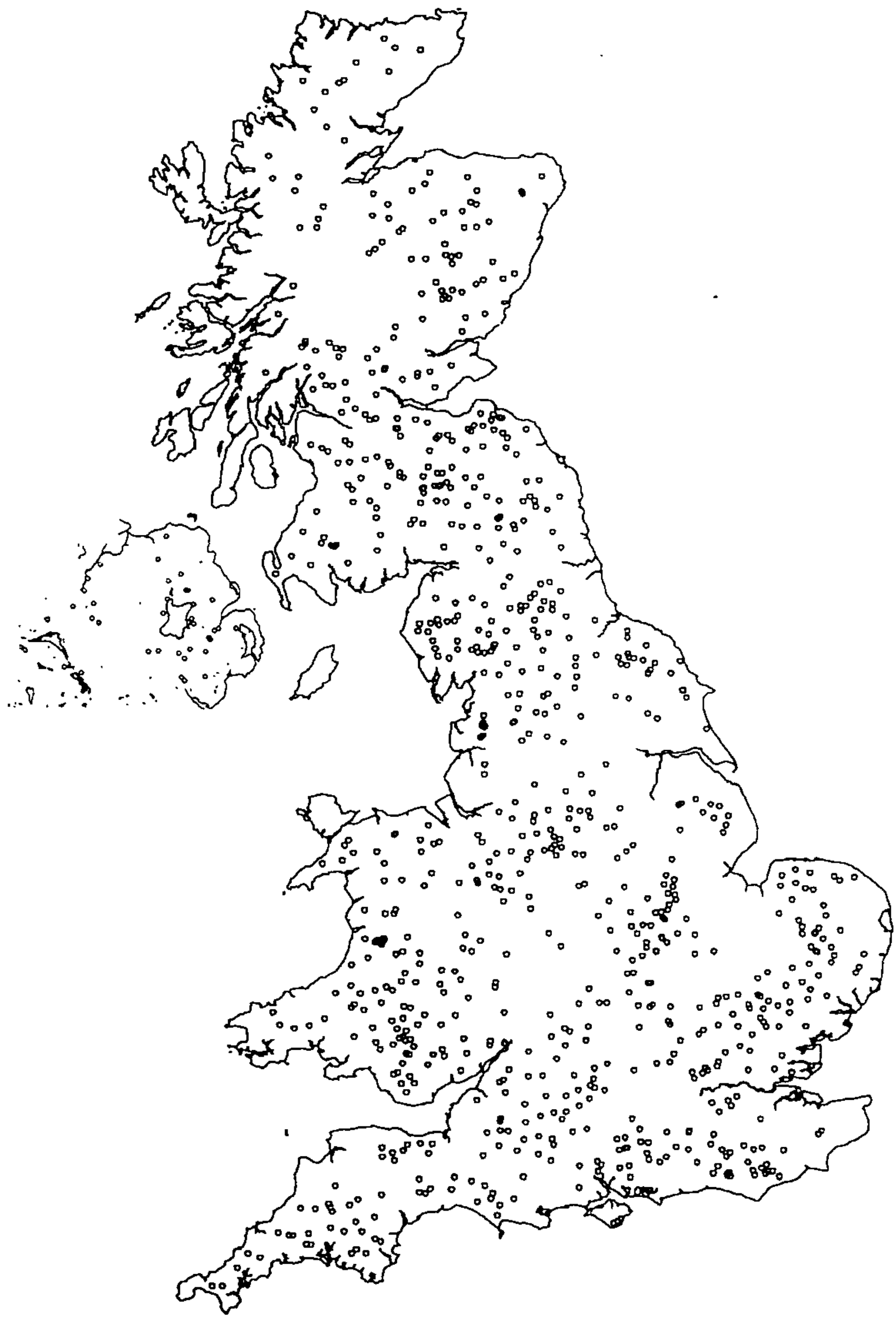


Figure 2.2 *Spatial distribution of usable (graded AA, AB, BA, BB) gauging stations*

Figure 2.3 *Spatial coverage of catchments above usable gauging stations*

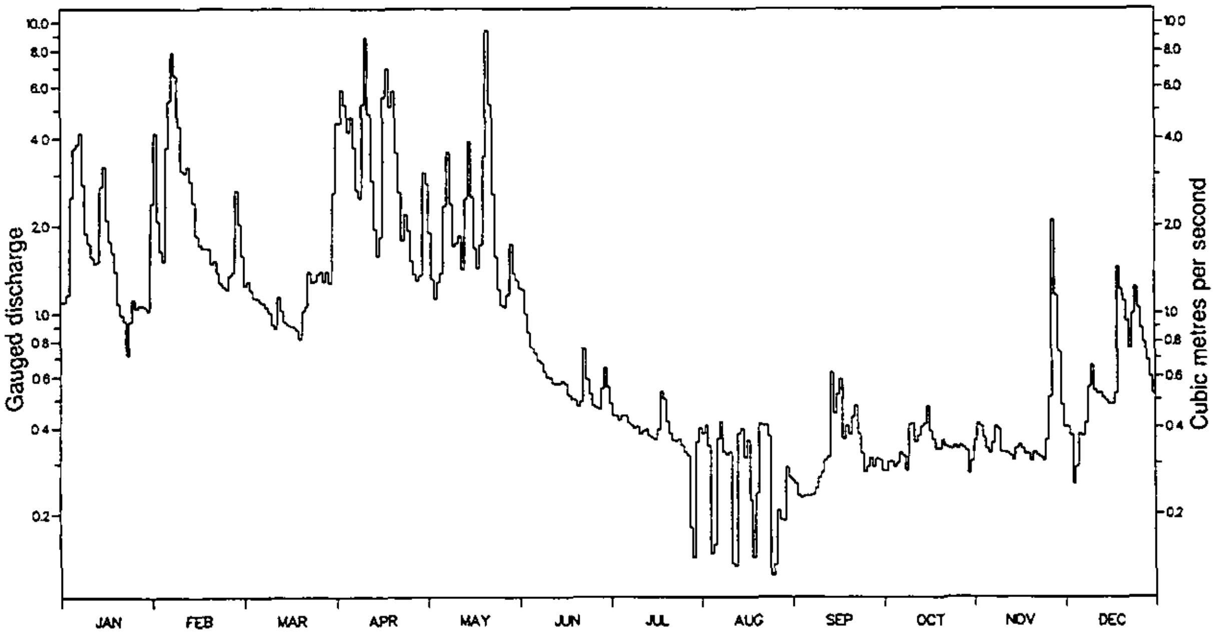


Figure 2.4a *Sluice operation impacts upon low flows*

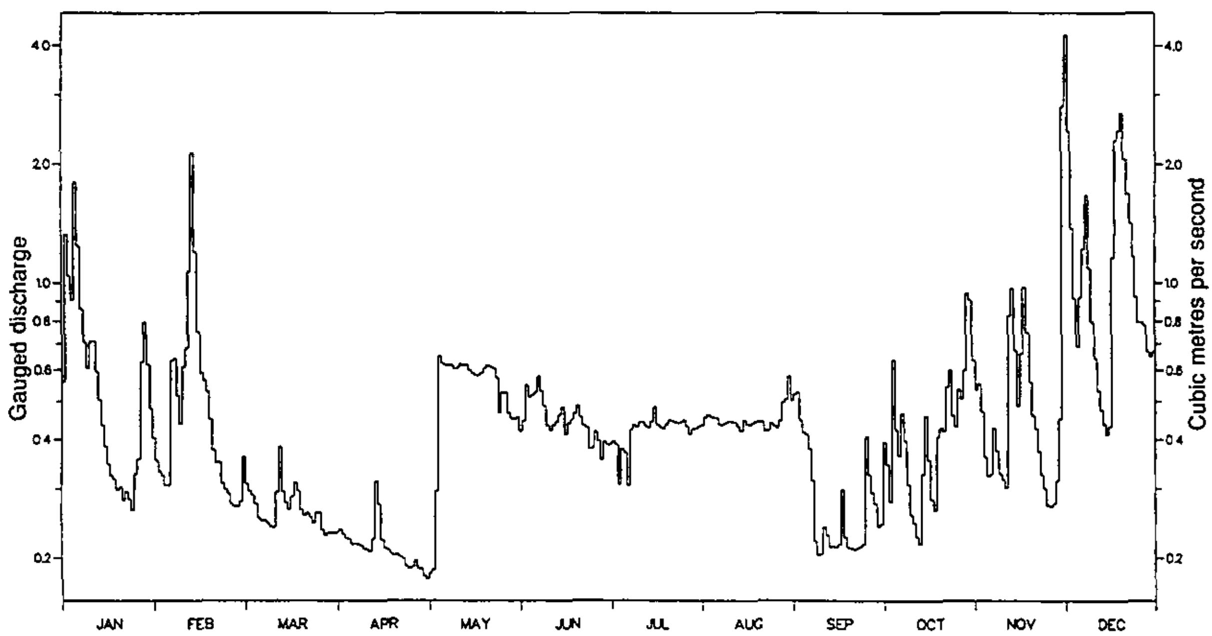


Figure 2.4b *Groundwater pumping impacts upon low flows*

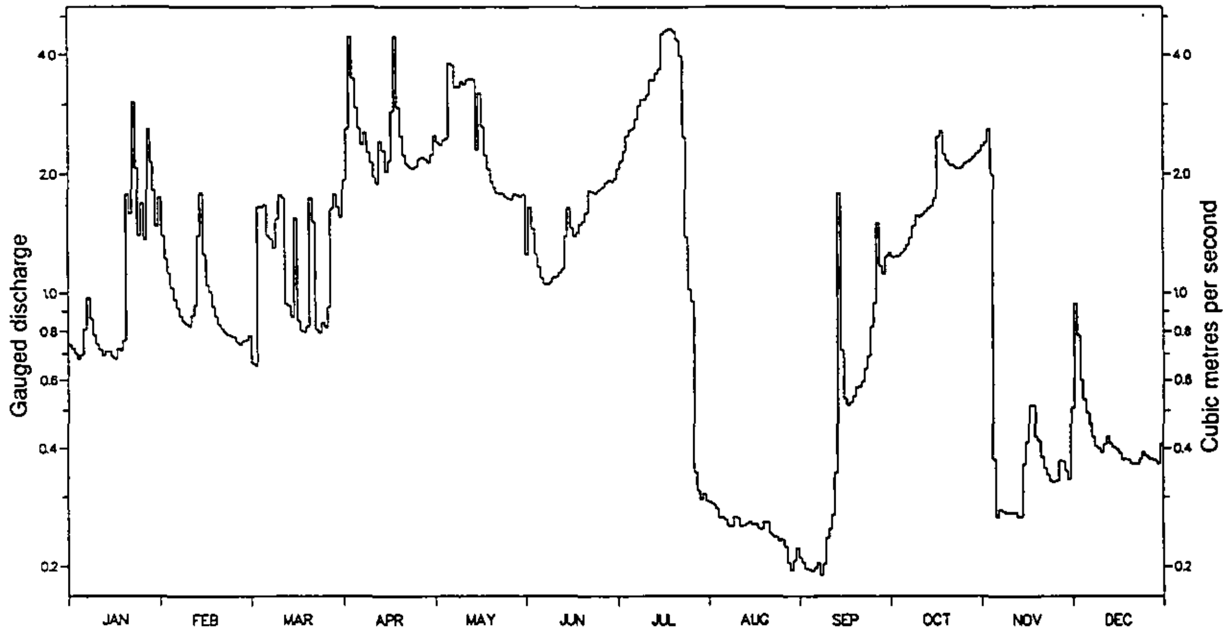


Figure 2.4c *Weed growth impacts upon low flows*

2.2 COMPARISON OF STATIONS USED IN 1980 AND 1992 LOW FLOW STUDIES

The 865 gauging stations graded as usable for low flow analysis is higher than the 538 stations (Daily or Weekly) available in the 1980 study although only 456 were analysed. The increase of 327 represents an increase of approximately 60% stations.

The number of gauging stations within each hydrometric area available in this report and the 1980 report are summarised in Table 2.5. These are summarised by administrative units of the water industry in Table 2.6. In particular, notable gaps which existed in Northern Ireland, central Scotland, the Midlands and the Thames Valley are filled by more recently established stations or by the application of different selection criteria. However, there remains sparse coverage of good quality natural gauged catchments in Western Scotland and the upper tributaries of the Tay, in southern Lancashire and Yorkshire, in Kent, and in the lowland regions of the Fens and Wessex, and the offshore islands.

Comparison of the flow records and catchment characteristics used in this study and the Low Flow Studies (1980) report are presented in Section 3.3.

Table 2.5 *Summary of number of gauging stations available in this report and Low Flow Studies (1980) report by hydrometric area*

HA	1980 Low Flow Study	This report	HA	1980 Low Flow Study	This report	HA	1980 Low Flow Study	This report
1	0	0	40	10	8	79	4	5
2	1	1	41	16	23	80	1	5
3	4	5	42	7	14	81	2	6
4	1	2	43	12	12	82	2	2
5	1	1	44	5	6	83	3	8
6	3	4	45	7	10	84	6	15
7	2	6	46	3	7	85	2	4
8	5	8	47	8	10	86	1	0
9	4	5	48	5	6	87	1	1
10	0	3	49	3	3	88	0	0
11	4	3	50	3	4	89	4	4
12	2	8	51	1	2	90	0	2
13	0	8	52	8	9	91	0	0
14	2	2	53	5	13	92	0	0
15	4	11	54	27	31	93	0	1
16	2	2	55	19	26	94	1	1
17	1	5	56	9	12	95	0	1
18	3	11	57	1	10	96	0	3
19	4	9	58	6	8	97	1	1
20	13	9	59	1	2	98	0	0
21	25	32	60	8	10	99	0	0
22	7	8	61	1	2	100	0	0
23	11	11	62	2	2	101	0	3
24	4	7	63	2	4	102	0	0
25	8	13	64	3	5	103	0	0
26	2	4	65	5	5	104	0	0
27	16	43	66	4	6	105	0	0
28	16	38	67	7	7	201	1	7
29	3	5	68	7	9	202	0	1
30	6	10	69	2	5	203	8	16
31	16	14	70	0	2	204	1	1
32	8	15	71	7	6	205	3	7
33	26	36	72	13	15	206	0	2
34	13	14	73	8	8	235	0	0
35	3	5	74	1	5	236	0	2
36	10	6	75	1	8			
37	16	13	76	5	10			
38	9	10	77	3	5			
39	6	46	78	1	4			

Table 2.6 *Summary of number of gauging stations available in this report and Low Flow Studies (1980) report by administrative unit of the water industry*

	1980 Low Flow Study	1992 This report
Highland RPB	11	21
North East RPB	14	29
Tay RPB	5	18
Forth RPB	21	32
Tweed RPB	21	27
Solway RPB	10	23
Clyde RPB	18	34
Scottish Hydro-electric plc	4	5
Grampian Region Water Department	1	1
Tayside Regional Council	3	4
Lothian Regional Council	2	3
NRA - Northumbrian region	32	41
NRA - Yorkshire region	18	47
NRA - Severn-Trent region	39	64
NRA - Anglian region	99	116
NRA - Thames region	17	58
NRA - Southern region	33	48
NRA - Wessex region	31	43
NRA - South-West region	29	40
NRA - Welsh region	65	91
NRA - North-West region	44	69
Dept. of Environment Northern Ireland	13	36
IH	8	15
Total	538	865

3 Calculation of flow statistics and catchment characteristics for gauging stations

3.1 FLOW STATISTICS

A number of different methods are available for characterising or defining the frequency of low flows. Based on a survey of users of low flow information in Australia, McMahon and Mein (1986) identified eleven different types of analysis which are used for river and reservoir yield evaluation. Beran and Rodier (1985) presented a comprehensive survey of the wide range of techniques which are used for describing the hydrological aspects of drought. An extensive review of the application of current theory to specific design problems of assessing river and reservoir yield has been illustrated with a number of practical examples (McMahon and Mein, 1986). For an individual drought period Hamlin and Wright (1978) described three approaches for identifying the development of the drought and assessing its severity. The UK Low Flow Studies report (Institute of Hydrology, 1980) advanced three main reasons for the proliferation of measures of low flow:

1. Different definitions of a low flow event: an event can be described in terms of a threshold discharge, an accumulated volume, a length of time spent below a threshold or a rate of recession;

2. Different methods of expressing frequency: the frequency or probability may be thought of as a proportion of time, e.g. flow duration curve, or as a proportion of years in which a given low flow occurs, e.g. flow frequency curve;

3. Different durations or averaging periods: many applications consider low flow not at an instant but averaged over some set period of time such as seven days or six months.

A number of measures and indices were derived using procedures described in the Low Flow Studies report (Institute of Hydrology, 1980). Many recommendations in this report are similar to those of the Small Research Basin Working Group of the Federal Republic of Germany (IHP/OHP, 1986) and to techniques for evaluating low flows and droughts described in the *Casebook of methods for computing hydrological parameters for water projects* (Lowing, 1987). Examples include the flow duration curve, the low flow frequency curve and low flow spells and volumes. These measures have also been derived in Australia (Nathan and McMahon, 1991) from daily flow data at gauged sites and prediction methods have been developed enabling estimation at ungauged sites.

In this study two low flow measures, the flow duration curve and the flow frequency curve, have been derived from daily discharge data. In addition the mean flow has been calculated and used to standardise the two low flow statistics. Standardisation by the mean flow facilitates comparison of frequency curves between catchments by removing the scale of the hydrological response. Estimation of flow statistics at the ungauged site was based on using the 1 km HOST (Hydrology of Soil Types) grid of the UK. A key variable in deriving this HOST data base was the Base Flow Index (BFI).

3.1.1 Mean flow

Mean flow (MF) is the arithmetic mean of the period-of-record sample of daily mean flows. The mean was used to standardise both low flow statistics in which case the missing data criteria appropriate to the analysis technique was used. The term mean flow is preferred to the term Average Daily Flow (ADF) used in the Low Flow Studies report (1980) because it is more specific in defining mean as the measure of central tendency to avoid confusion with median and mode, and also removes the daily time interval which is the source of some confusion. Mean flow expressed in depth of runoff (in mm) is termed Average Annual Runoff Depth (AARD) later in this report.

3.1.2 Base Flow Index

A number of regional low flow studies including Wright (1974), Klaassen and Pilgrim (1975), Institute of Hydrology (1980) and Pirt and Douglas (1982,(b)) have highlighted the importance of indexing the hydrogeology of the catchment if flows are successfully to be predicted at the ungauged site. In order to avoid a profusion of relationships between low flow indices and catchment characteristics, the Low Flow Studies report (Institute of Hydrology, 1980) recommended using the proportion of base flow in the river defined by a Base Flow Index (BFI), for indexing the effect of geology on low flows. Figure 3.1 illustrates the method of derivation of the index using programmable smoothing and separation rules on the daily mean flow hydrograph. Figure 3.2 contrasts the hydrographs and values of BFI for two catchments with contrasting geology (values of BFI range from 0.1 for a very flashy river to nearly unity for a very stable river with a high base flow proportion). Calculated BFI values for gauging stations are presented in Appendix 2.

Although the index was originally related to geology and lake storage in the UK, a wider use of the index in Canada (Pilon and Condie, 1986), Fiji (Green, 1986), Zimbabwe (Meigh, 1987), New Zealand (National Water and Soil Conservation Authority, 1984) and Norway (Tallaksen, 1986) has shown it to have been useful in regional flood and low flow studies. The concept has also been used in Australia (Nathan and McMahon, 1990a) where it is used as a key variable in low flow estimation techniques.

Unlike the Low Flow Studies report (Institute of Hydrology, 1980), BFI is not used directly as a key variable linking low flow statistics and catchment characteristics. Instead, the Base Flow Index was used as a key variable in describing the hydrological response of catchments in order to develop the HOST classification scheme (Section 3.2.4). The 29 HOST classes and URBAN and LAKE were subsequently clustered into 12 low flow groups for use in this study. Additionally, BFI can be used for the estimation of key low flow statistics where short periods of flow data are available, as described in Chapter 6.

Baseflow separation procedure
The Base Flow Index (BFI) can be thought of as measuring the proportion of the river's runoff that derives from stored sources. A computer program applies smoothing and separation rules to the recorded flow hydrographs from which the index is calculated as the ratio of the flow under the separated hydrograph to the flow under the total hydrograph (Figure 3.1).

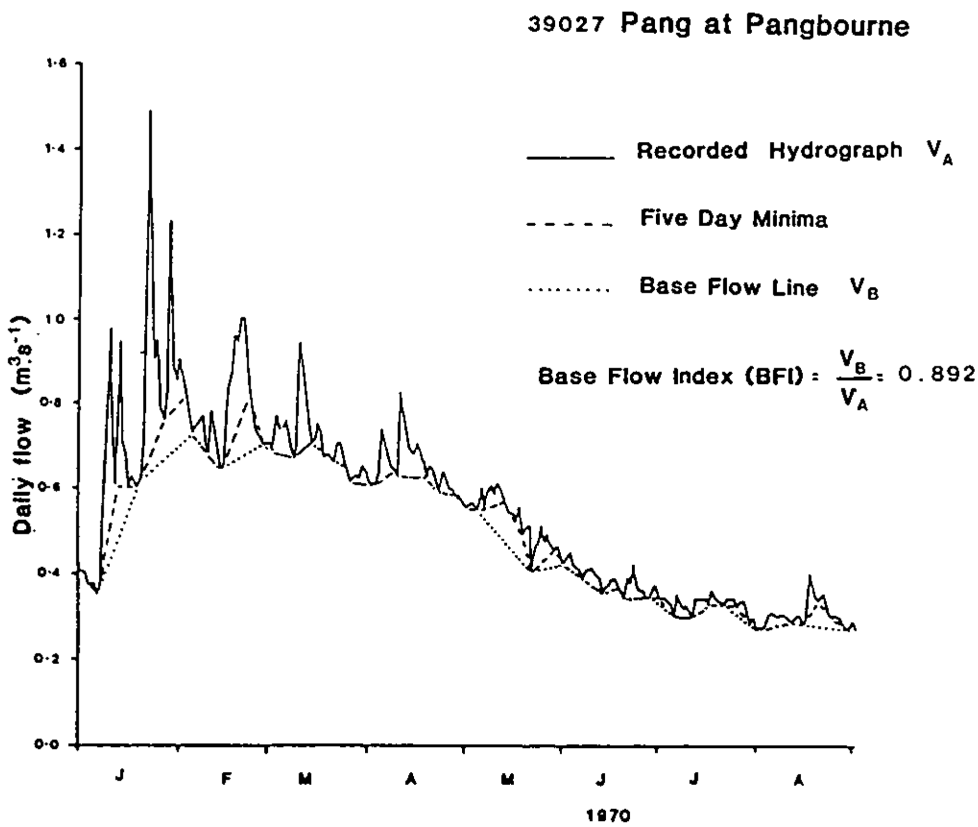


Figure 3.1 *Derivation of the Base Flow Index*

The program calculates the minima of five-day non-overlapping consecutive periods and subsequently searches for turning points in this sequence of minima. The turning points are then connected to obtain the base flow hydrograph which is constrained to equal the observed hydrograph ordinate on any day when the separated hydrograph exceeds the observed. The procedure for calculating the index is as follows:

1. Divide the mean daily flow data into non-overlapping blocks of five days and calculate the minima for each of these blocks, and let them be called Q_1, Q_2, Q_3...Q_n.

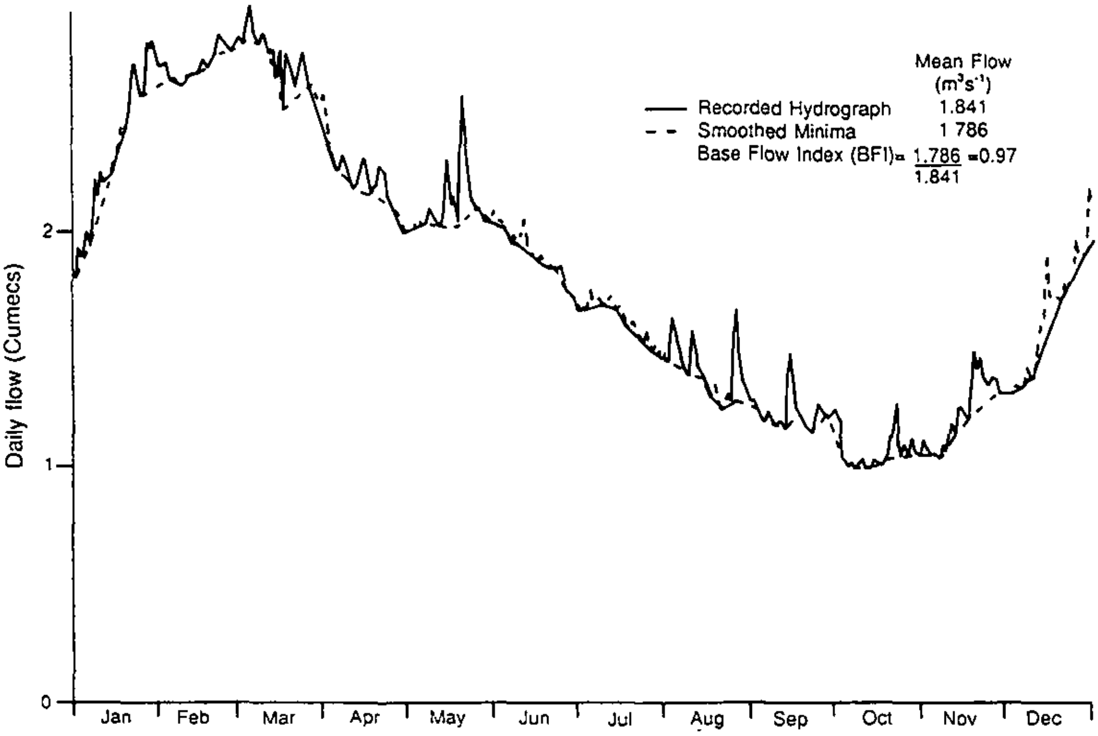
2. Consider in turn (Q_1, Q_2, Q_3,), (Q_2, Q_3, Q_4),...(Q_{i-1}, Q_i, Q_{i+1}) etc. In each case, if 0.9 x central value < outer values, then the central value is an ordinate for the baseflow line. Continue this procedure until all the data have been analysed to provide a derived set of baseflow ordinates QB_1, QB_2, QB_3,...QB_n which will have different time periods between them.

3. By linear interpolation between each QB_i value, estimate each daily value of QB_1...QB_n

4. If $QB_i > Q_i$ then set $QB_i = Q_i$

5. Calculate V_B the volume beneath the baseflow line between the first and last baseflow turning points QB_1... QB_n

3.2a) Lambourn at Shaw - permeable



3.2b) Falloch at Glen Falloch - impermeable

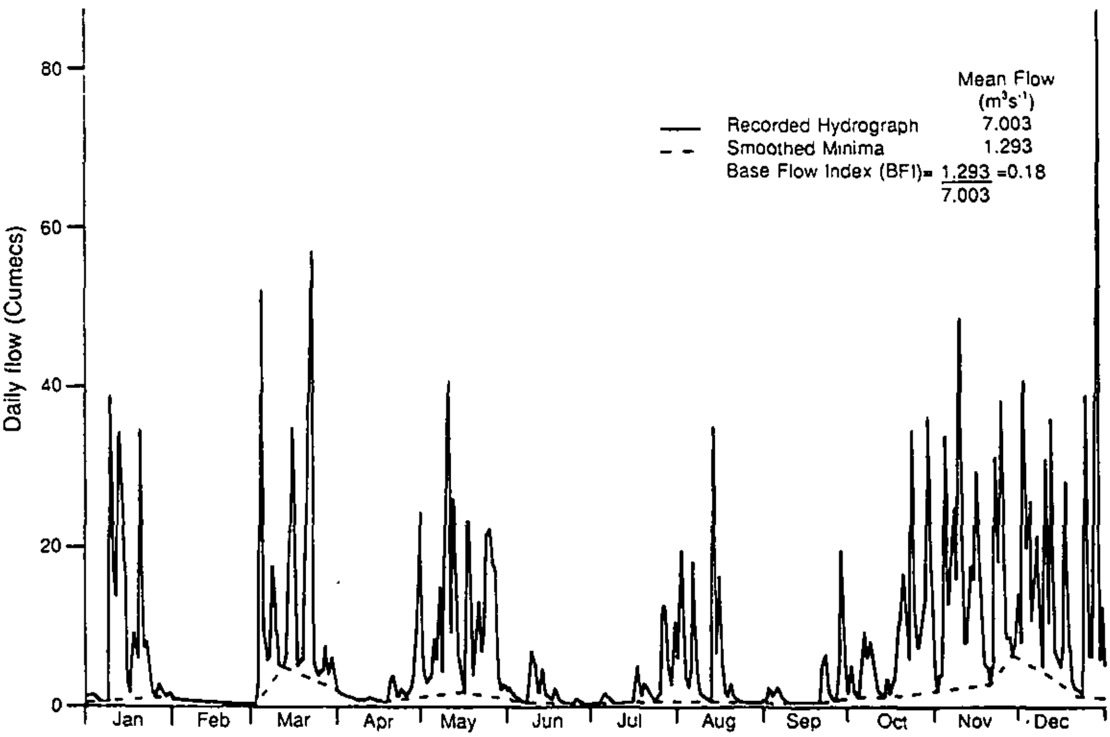


Figure 3.2 *BFI for two catchments with contrasting geology a) predominantly permeable, b) predominantly impermeable*

6. Calculate V_A the volume beneath the recorded mean daily flows Q_n for the period QB_1 ... QB_n.

7. The Base Flow Index is then V_B/V_A.

Baseflow line start and finish points
Baseflow separation cannot start on the first day of the data record and similarly will not finish on the last day of record. It is important therefore to recognise that when the dates of the beginning and end of the baseflow line have been established, then these same dates must be used in calculating the total volume of flow beneath the hydrograph as well as in calculating the volume of flow beneath the baseflow line.

Calculation of annual BFI
There are two alternative methods for calculating annual BFIs. The first is to compute the separation for the entire record and then estimate BFI for each year. The second is to run the separation program on year 1 and then on year 2 etc., starting each year as an entirely new record. In the latter case a few days in early January and late December will be eliminated from the calculation for each year of record. The two approaches differ slightly and for calculating annual values the first procedure is recommended.

Calculation of period of record BFI
A mean value of BFI can be calculated from a series of annual BFIs, but this will be different from a single value calculated from the period of record. BFI is defined as the ratio V_B/V_A where V_B represents the volume beneath the baseflow separation line and V_A represents the mean flow beneath the hydrograph.

Ten years of record will provide ten annual values of BFI. However, the mean of these ten values will not in general equate to the single value obtained from the entire ten years of record. This can easily be seen by the following example, showing three years of artificial data in which 'year 1' is of a very different character.

	Year 1	Year 2	Year 3	Total
V_B	9.0	40.0	40.0	89.0
V_A	10.0	100.0	100.0	210.0
BFI = V_B/V_A	0.9	0.4	0.4	0.424

Here, the mean of the three annual BFI values is 0.567 while the overall value is 0.424. The recommended procedure is to calculate one value of BFI based on a separation of the entire record.

BFI variability
Studies of BFI variability found that annual values of BFI were more stable than other low flow variables. For example the coefficient of variation of annual Base Flow Index values was found to be one-third of Q95(10) values. A more detailed study of BFI variability in Scotland (Gustard *et al.*, 1987) was carried out on 135 stations which had more than nine years of record. The coefficient of variation (Figure 3.3) and the standard deviation of annual BFIs were calculated for each of the 135 stations and the mean of these standard deviations was

found to be 0.054. This finding that values estimated from short records could be used with confidence supported the use of BFI as a key variable in low flow estimation procedures.

A linear regression was performed for each station between annual BFI and annual runoff to test whether wet or dry years had a tendency to give rise to low or high BFI values. Over 100 of the 135 records had values of explained variance less than 30% indicating a weak relationship between annual BFI and annual runoff. Only 20 stations had explained variances in excess of 50% and these were located mainly in eastern Scotland. Further investigation revealed that most of these stations had their highest annual BFI in the drought years of 1973 and 1976. These results suggest that although years of extreme drought may produce higher than average BFIs, most annual BFIs are close to the long term value. Provided extreme years are avoided, the BFI can be estimated with confidence from a short record, with an error of 0.05 being typical for estimates derived from a single year of daily mean flow data in Scotland.

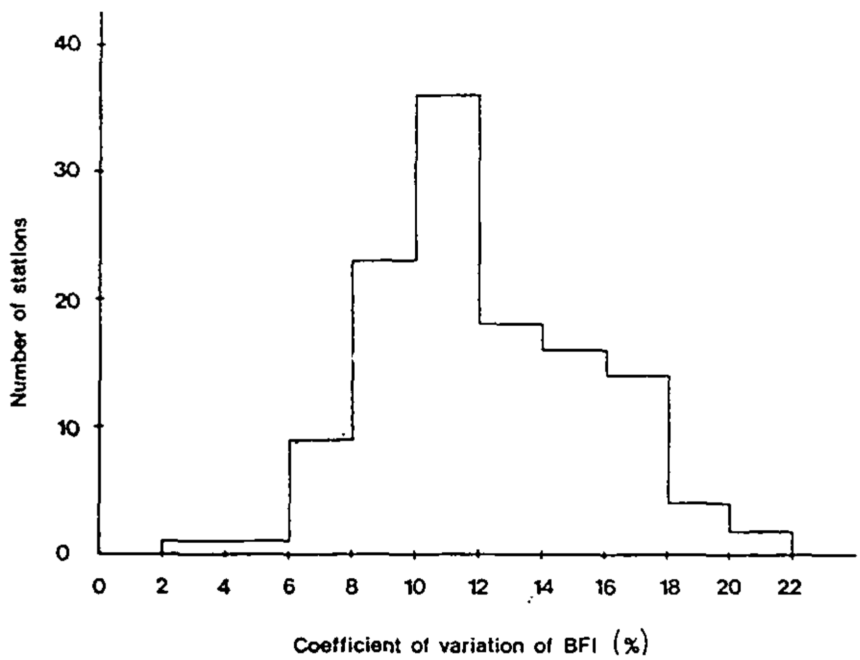


Figure 3.3 *Coefficient of variation of annual BFI values in Scotland*

Hydrometric errors and missing data
A study was carried out to assess the influence of hydrometric errors and missing data on BFI. A bias was applied to the gauged flow data by increasing or decreasing daily flow data to simulate hydrometric error. The sensitivity of the derived BFI to this simulated error was then examined. The main results were that the percentage error in BFI was less than a given percentage error in flow data and the error was largest for catchments with low BFI values. For example, a 10% error in high flows (Q5) or low flows (Q95) resulted in a 7% error in BFI for low BFI catchments (0.2) and less than 1% error in BFI for high BFI (0.9) catchments.

A similar sensitivity analysis was carried out to evaluate the impact of missing data on calculated values of BFI. The value of BFI was shown to be sensitive to missing data primarily because several days of data are omitted from the base flow separation as a result of only 1 missing day of gauged data. It was concluded that improvement in BFI estimation is achieved by interpolating up to a maximum of 5 missing days. However BFI values must be used with caution if the record contains several gaps (more than 2% of the record).

3.1.3 Flow duration curve

The cumulative frequency distribution of daily mean flows shows the percentage of time during which specified discharges are equalled or exceeded during the period of record. The relationship is normally referred to as the flow duration curve and although it does not convey any information about the sequencing properties of flows it is one of the most informative methods of displaying the complete range of river discharges from low to flood flows. The curve is most conveniently derived from daily discharge data by assigning daily flow values to class intervals and counting the number of days within each class interval. The proportion of the total number of days above the lower limit of any class interval is then calculated and plotted against the lower limit of the interval. A normal probability scale is used for the frequency axis and a logarithmic scale for the discharge axis. These transformations assist in linearizing the plot and so aid estimation from the curve of discharges for given frequencies. If the logarithms of the daily discharges are distributed normally then the plotted points define a straight line.

Within Institute of Hydrology flow duration software, all daily data from a specified period are pooled and the cumulative frequencies are determined based on the grouping of flows within 400 classes. The classes have logarithmic boundaries, the lowest boundary being 1% of mean flow and the highest boundary being 1000% of the mean flow. A Normal probability scale is used, ranging from 0.01 to 99.99%. All available data within the specified period are used in the determination of the flow duration curve.

The slope of a flow duration curve drawn on log-normal axes is a measure of the standard deviation of the logarithms of discharges (SDL). By reading the ordinates of an eye-fit straight line at, for example, abscissae of 5% and 95%, Q5 and Q95, and assuming a log-normal distribution then an estimate of the standard deviation can be obtained from

$$\log Q5 - \log Q95 = 3.29\ SDL \tag{3.1}$$

Furthermore, the standard deviation of the logarithms, SDL, is approximately proportional to the coefficient of variation, CV, of the original data. Thus

$$CV = 0.43\ SDL$$

or

$$CV = 0.132 \log (Q5/Q95)$$

Figure 3.4 shows the flow duration curves for two catchments on contrasting geology. Catchment 39019, Lambourn at Shaw, is a lowland chalk catchment with a characteristically flat flow duration curve, reflecting the relatively low variability of flows about the mean flow. Conversely, catchment 85003, Falloch at Glen Falloch, is a typical upland Scottish basin on impermeable geology with a characteristically steep flow duration curve, indicative of a flashy

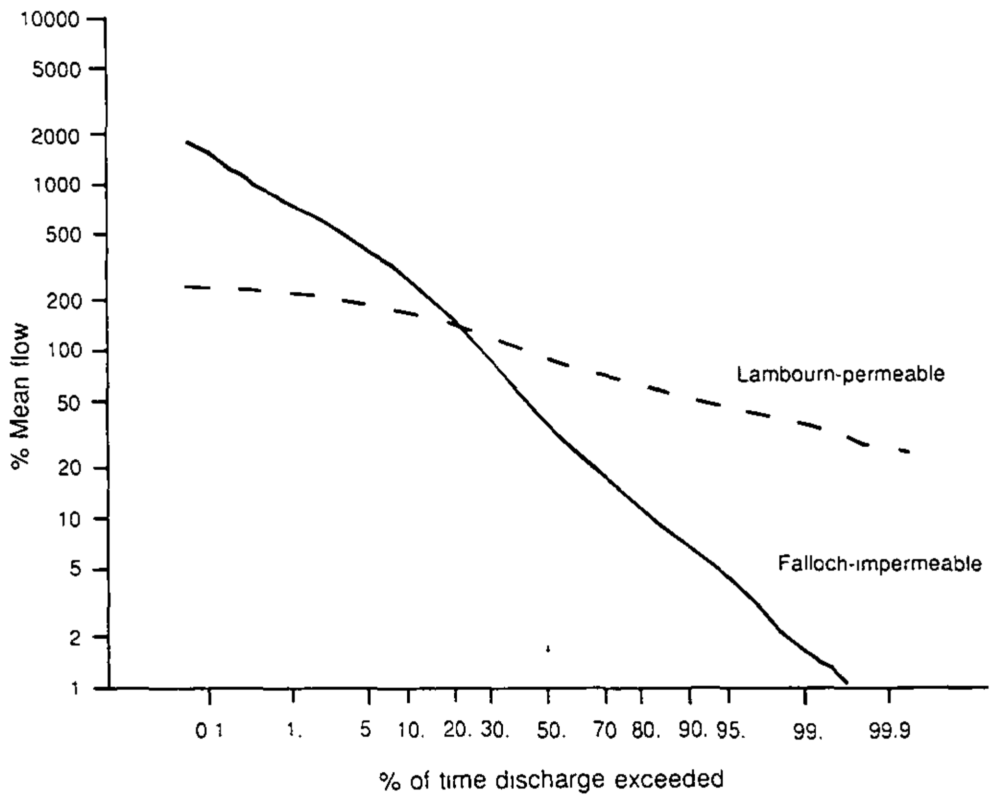


Figure 3.4 *Example flow duration curves*

flow regime and a high variance of daily flows. Note that the discharge axis is standardised by the mean flow. This facilitates comparisons between catchments because it reduces differences in the location of the flow duration curve which are caused by differences in the mean annual runoff. This standardisation may also reduce the bias of estimated percentiles caused by above or below average flows during the period of record. Curves may also be obtained from a derived hydrograph obtained by applying a D day moving average to the original hydrograph. This enables the proportion of D day periods when the average discharge over D days is greater than a given value to be estimated.

In this study only the 1 day flow duration curve has been regionalised. For practical purposes the curve drawn for D=1, i.e. daily data, may be equated with the curve drawn from continuous data at least when considering low flows. The low flow index from the flow duration curve used to generalise to ungauged locations is the 95 percentile 1 day discharge, Q95(1).

In the 1980 Low Flow Studies report methods were developed for estimating flow duration curves based on moving averages ranging from 1-180 days. The ten day 95 percentile discharge, Q95(10), was used as a key low flow index in the estimation procedure. A review of the UK Water Industry identified that the majority of organisations used the 1 day curve for design purposes. It was therefore decided to regionalise only the 1 day flow duration curve, using Q95(1) (the 95 percentile from daily data) as the key variable for regionalising.

3.1.4 Low flow frequency curve

While the flow duration curve is concerned with the proportion of time that a flow is exceeded, the flow frequency curve shows the proportion of years, or equivalently the average interval between years (return period), in which the river falls below a given discharge. As with other measures of low flow it can be derived from one or D daily data. The moving average interpretation of D-day values given for the flow duration curve applies equally for the flow frequency case where in fact a D-day annual minimum becomes a point minimum of the derived hydrograph.

The method of drawing the flow frequency curve (Figure 3.5) is: (1) find the lowest flow in each year (from the moving average data where required); (2) rank them from highest to lowest; (3) assign a plotting position to each ranking; (4) plot the discharge against the plotting position; (5) draw a smooth curve through the points. In this study such curves have been drawn using the Weibull distribution;

$$f(x) = (\gamma/\theta)\ x^{\gamma-1} \exp(-x^{\gamma}/\theta) \qquad 0 < x < \infty \tag{3.2}$$

$$F(x) = 1 - \exp(-x^{\gamma}/\theta) \tag{3.3}$$

where: $f(x)$ is the density of x

$F(x)$ is the probability of non exceedance

θ and γ are parameters of the Weibull distribution which determine the scale and the shape respectively.

This can be shown to be identical to the Extreme Value Type III (EV3) distribution (NERC, 1975, I p88) if x is replaced by -x, i.e. if a variable is distributed as EV3 its negative is distributed as Weibull, and is identical to Gumbel's 'limited distribution of the smallest value' (Gumbel, 1958, p278). This distribution has been used in low flow studies in the United States (Matalas, 1963; Joseph, 1970), and in the UK (Institute of Hydrology, 1980), and in Malawi (Drayton *et al.*, 1980). Nathan and McMahon (1990b) have carried out a detailed analysis of the relative performance of three estimation methods (moments, maximum likelihood and probability weighted moments) based on fitting the Weibull distribution to annual minima from 134 flow records in Australia.

The relevant formulae for the plotting position of the ith largest of a sample of N are:

$$P_i = (i-0.44)/(N+0.12) \tag{3.4}$$

$$y_i = -\ln(-\ln P_i) \tag{3.5}$$

$$W_i = 4(1-e^{-.25y_i}) \tag{3.6}$$

$$T_i = (1-P_i)^{-1} \tag{3.7}$$

where y is the EV1 reduced variate

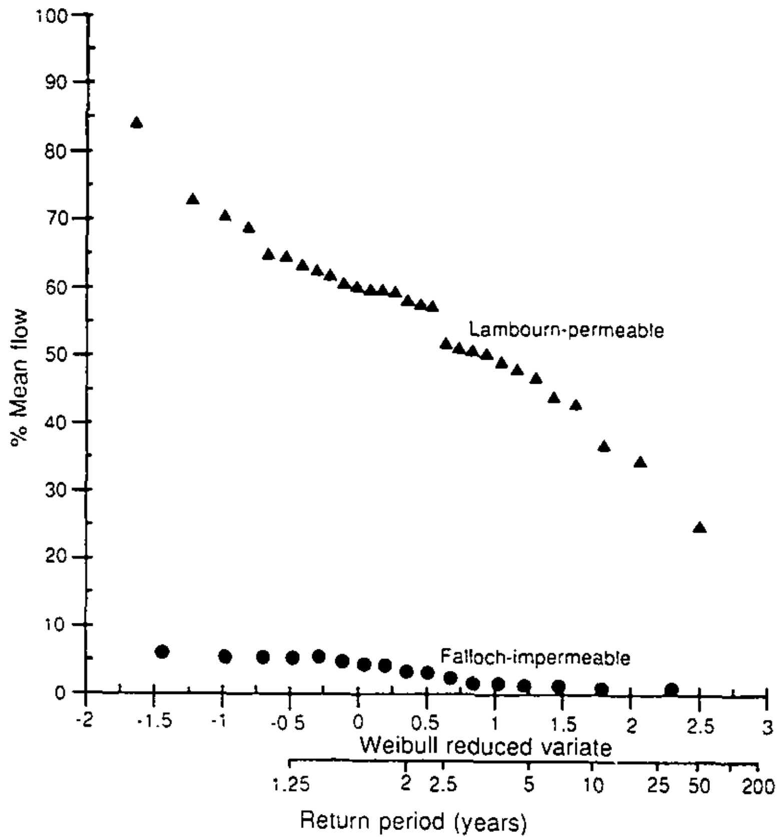


Figure 3.5 *Example low flow frequency curves*

P_i is the corresponding exceedance probability

W_i is the plotting position for a given value of γ which in this analysis was set to 4.0

T_i is the corresponding return period.

While data that are drawn from the Weibull distribution with appropriate γ value will plot as a straight line, this is not assumed in this study and the assumption is to be regarded as providing a convenient plotting scale. Although for interpolation and moderate extrapolation the choice of distribution is not critical, pooled frequency curves (Section 5.2) plot close to straight lines supporting the choice of distribution and the value of the Weibull shape parameter of $\gamma=4.0$. The program extracts minima of up to nine D values, in the current study 1, 5, 7, 10, 30, 60, 90, 180, and 365 days. A review of the use of annual minima data by the UK Water Industry indicated that the mean annual 7 day minima, MAM(7), is the most common statistic used for design purposes. The low flow index, MAM(7), was therefore used as a key statistic for regionalisation (Section 4.2) and was calculated for all stations with more than 5 years of record. For deriving pooled flow frequency curves all stations with more than 20 years of data were analysed. Gauged values of MAM(7) are tabulated in Appendix 2 and gauged values of MAM(D) are tabulated in Appendix 5.

Within Institute of Hydrology low flow frequency software, missing data criteria were set to be a maximum of 7 missing days in any water year (1 Oct - 30 Sept). If any water year contained more than 7 missing days then all data from that year were excluded from analysis. This ensures that annual minima are not selected from years containing significant gaps in the data and that they are expressed as a percentage of the mean flow using a common period from which both minima and mean were calculated.

Figure 3.5 shows the low flow frequency curves for two catchments with contrasting geology. Note that the lowland Chalk catchment has significantly higher annual minima than the upland impermeable catchment, when expressed as a percentage of the mean flow.

The application of the low flow frequency curve is similar to the flow duration curve but it is better equipped to describe rarer events and enter into economic evaluations. Note that 90% exceedance on the flow duration curve is a more common event than 90% or 10 year return period low flow from the flow frequency curve. By nesting flows of a given frequency of increasing durations within each other it is possible to construct artificial drought sequences for preliminary reservoir design purposes.

3.2 METHOD OF CALCULATION OF CATCHMENT CHARACTERISTICS

3.2.1 Catchment area (AREA, km^2)

The catchment boundaries of all gauging stations graded AA, AB, BA and BB were drawn onto 1:50,000 scale topographic maps (occasionally 1:25,000 scale for small catchments), taking note of the river network, contours and spot heights. The topographic area gives a satisfactory representation of drainage area, except in those cases where the groundwater divide is known to deviate from the topographic divide, as in some chalk and limestone areas. Particular attention was given to the location of upstream and downstream confluences. Artificial drainage lines were ignored. After digitisation the coordinates of the boundary were archived and later used to overlay onto the gridded thematic data bases to determine catchment average values. AREA was calculated by a computer program and stored in units of km^2. If this differed by more than 2% from the published area then discussions with the operating authority resolved outstanding problems of boundary definition and if necessary boundaries were re-drawn and re-digitised. This study was of course able to make use of previously drawn and digitised catchment boundaries stored by the National Water Archive.

3.2.2 Standard period average annual rainfall (SAAR,mm)

Maps of standard period (1941-1970) average annual rainfall (SAAR) at 1:625,000 scale covering the UK are available from the Meteorological Office and were published in the Flood Studies Report (NERC, 1975). The map was digitised by the Institute of Hydrology and a 1 km grid derived from a polynomial fit to the digitised isohyetal data. Precipitation data are stored to a resolution of 1 mm. For automatic derivation of SAAR the digitised catchment boundary (see section 3.2.1) was overlaid onto the digitised data base of standard average annual rainfall and a catchment average value calculated by the computer program. Values of SAAR were used in regionalising low flows and for estimating the mean flow at the ungauged site.

3.2.3 Average annual potential evaporation (PE, mm)

Potential evaporation is estimated from the Meteorological Office 1:2,000,000 map of average annual potential evaporation (provisional version) which is based on the Penman equation with a surface albedo of 0.25. The map has been digitised by the Institute of Hydrology and a 1 km grid has been derived using a polynomial fitting method. Although the data are held to a resolution of 1 mm the error in estimating PE from the map is of the order of 25 mm.

PE was obtained by the weighted area method by overlaying the digitised catchment boundary onto the gridded data. PE was only used in this study for estimating mean flow at the ungauged site (section 4.1.1).

3.2.4 Hydrology of Soil Types (HOST) classification[1]

A number of studies have identified the key role of catchment hydrogeology in controlling the low flow response of a catchment (Institute of Hydrology 1980, Pirt and Douglas 1980, Gustard *et al.* 1989). Problems of numerically describing this role have contributed to the difficulty in estimating low flows at ungauged sites and to the practical utility of applying a consistent method nationally. The Low Flow Studies (1980) report sought to overcome these problems by using the Base Flow Index as a key variable to index hydrological response from which other flow statistics could be derived. Examples were given of how the index could be estimated at an ungauged site from catchment geology and it was anticipated that hydrologists would develop these procedures based on their detailed knowledge of hydrogeology and low flow response. Although some regional relationships were derived between the Base Flow Index and local geology in Southern England (Southern Water Authority 1979), and Scotland (Gustard, Marshall and Sutcliffe, 1987) the lack of a national low flow response map was a major constraint to the practical application of estimation techniques in the UK.

One earlier national hydrological classification of soils was the Winter Rainfall Acceptance Potential (WRAP) scheme developed for use in the Flood Studies Report (NERC 1975), and described in more detail by Farquharson *et al.* (1978). The WRAP scheme assigned soil classes to five WRAP classes on the basis of four properties; drainage class, depth to an impermeable layer, permeability rates above an impermeable layer and slope. A 1:1,000,000 scale map was produced showing the distribution of the five classes, and was enlarged to 1:625,000 for inclusion in the Flood Studies Report Volume 5. WRAP classes were not formally used in the Low Flow Study (Institute of Hydrology, 1980), but were utilised in regional low flow estimation procedures in the Severn-Trent region (Pirt & Douglas 1980), in Scotland (Gustard *et al.*, 1987), and the North-West region (Bullock and Gustard 1989).

The completion of the mapping of soils in Great Britain at a scale of 1:250,000 by the Soil Survey and Land Research Centre (SSLRC) and Macaulay Land Use Research Institute (MLURI) provided an opportunity to revise the scale and discrimination of the WRAP classification scheme. However, rather than revise the WRAP map at a more detailed scale it was decided to use the large hydrological data bases held at the Institute of Hydrology to assist in the definition of classes.

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[1] The authors would like to acknowledge the work of the HOST project without which the low flow analysis would not have been possible. The description of the HOST classification scheme in this section of the report is based on Boorman and Hollis (1990) and Boorman *et al.* (1991).

This was carried out by the Hydrology of Soil Types (HOST) project which has provided a data base from which low flow response units could be derived on a consistent basis with national coverage. This project involved collaboration between the Institute of Hydrology, the Soil Survey and Land Research Centre (SSLRC), The Macaulay Land Use Research Institute (MLURI) and the Department of Agriculture Northern Ireland. Details of data used in the study are described by Boorman *et al.* (1991) and the classification procedure by Boorman and Hollis (1990). The project benefited firstly from the completion in 1983 of the revised soil mapping and associated data base of soil properties of England and Wales, and secondly, in Scotland in 1984, by combining this soil data base with national hydrological data to classify the soils of the UK into a number of HOST classes.

Published soil maps depict the distribution of soil associations and lake and urban areas at a scale of 1:250,000. Each of the associations comprise of one or more soil series that occur together in the landscape. Soil series are distinguished by precise definitions of soil and substrate properties that can be assessed by soil survey. Different classification procedures are used for the series and hence for the associations by SSLRC and MLURI. Consequently, in England and Wales there are 299 soil associations containing 417 series and in Scotland there are 590 associations with 552 series. Soil mapping is currently being carried out by the Department of Agriculture in Northern Ireland but a provisional HOST map and data set has been prepared.

The soil association maps have been digitised and stored as both vector and raster data sets, the latter at a resolution of $1km^2$ and $100m^2$. Data is also available describing the physical properties of the soil series and the proportions of series within the soil associations. For example in England and Wales there is physical property data for 4000 soil layers describing over 1000 soil profiles. Table 3.1 presents the physical properties that were used in the HOST project, each property is available for each soil series. It was thus the soil series that was used as the key soil unit in the analysis. Two of the "soil" variables in Table 3.1 describe hydrogeological characteristics. The soil hydrogeology of the underlying parent material is based on the 1:625,000 scale Hydrogeological maps of England and Wales (Institute of Geological Sciences, NERC 1977) and Scotland (NERC, 1988). The depth to an aquifer or groundwater are based on observed and estimated depths for each soil series. Thus although the HOST project makes extensive use of a soil data base it incorporates hydrogeological data and is therefore appropriate for low flow analysis.

Hydrological data

The primary hydrological variable that was used in the HOST project was the Base Flow Index (Section 3.1.2). The index is the ratio of the base flow to total flow, derived from the long term time series of mean daily flows using a simple baseflow separation procedure. The index ranges from 0.99 for flow hydrographs dominated by base flow typical of permeable chalk catchments to 0.10 for very flashy catchments with very impermeable hydrogeology and soil type. Although over 1200 BFI values were available for analysis a quality control of the data to exclude flow records significantly influenced by artificial factors and with poor hydrometry reduced the number used in the HOST study to 826. The rejection of catchments with urban or lake fractions in excess of 5% led to a usable data set of 633 catchments. In addition Standard Percentage Runoff (Boorman *et al.*, 1991), derived from event data from 202 catchments, was used to verify the value of the HOST classification for Flood Studies applications. For each catchment the topographic boundary was drawn and digitised. Using computer overlay facilities the vector catchment boundary data base was overlain on the raster soil association data to derive the percentage cover of each soil association for each catchment. National average values of the percentage of each soil series in each association were then used to derive the percentage of each series in each catchment.

Table 3.1 *Physical properties of soil series used in HOST classification*

1. Soil hydrogeology

A soil hydrogeology classification was derived specially for the HOST project using soil parent material definitions and the 1:625,000 scale Hydrogeological Map of England and Wales (Institute of Geological Sciences 1977). The scheme is used to differentiate between mechanisms of vertical water movement (e.g. intergranular or fissure flow), and to distinguish between permeable, slowly permeable and impermeable substrates. Definitions of permeability are based on Bell (1985). Permeable substrates have a vertical saturated conductivity of more than 10cm/day and an aquifer or shallow water table. Slowly permeable substrates have a vertical saturated conductivity of 10 to 0.1cm/day and may contain a local or concealed aquifer. Impermeable substrates have a vertical saturated conductivity of less than 0.1cm/day and contain no aquifers.

2. Depth to aquifer or groundwater

This indicates the time taken for excess water to reach the water table.

3. Presence of a peaty topsoil

A raw peaty subsoil indicates saturated surface conditions for most of the year, limits infiltration and provides lateral pathways for rapid response in the uppermost part of the soil.

4. Depth to a slowly permeable layer

A slowly permeable layer impedes downward percolation of excess soil water causing periodic saturation in the overlying layer. Storage is reduced and there is an increased response to heavy rainfall.

5. Depth to gleyed layer

Gleying is the presence of grey and ocherous mottles within the soil caused by intermittent waterlogging. The particular definition of gleying used (Hollis 1989) identifies soil water layers wet for at least 30 days each year, or soils that are artificially drained.

6. Integrated air capacity

The air capacity, or 'drainable' pore space of a soil layer, is defined as its volumetric air content at a tension of 5 Kilo Pascals (KPa) (approximately field capacity). Integrated air capacity (IAC) is the average percentage air volume over a depth of one metre. This provides a surrogate for permeability in permeable soils and substrates (Hollis and Wood 1989). In slowly permeable soils or impermeable soils and substrates, IAC indicates the capacity of a soil to store excess water.

The HOST classification

The relationship between hydrological response and soil type was derived by relating the BFI values for the 633 catchments to the physical properties of the soil series. The approach adopted was to develop a classification scheme to group the large number of soil series into a smaller number of HOST classes. Simple conceptual models (Boorman and Hollis, 1990) describing the flow paths of water provided a structure to the classification scheme. Initially the 969 soil series were analysed and those with similar flow paths (indicated by their physical properties) were grouped together into a single HOST class. This produced a more manageable data set for further analysis. The percentage cover of the reduced number of classes were then related to gauged BFI values using multiple regression analysis, and by inspection of the response of individual catchments. This provided further guidance on discriminating and grouping soil series. A number of different schemes were derived, the provisional scheme used in this study consisted of 29 HOST classes and in addition URBAN and LAKE. This scheme is presented in Table 3.2. This HOST scheme explains over 80% of the observed variance in BFI and 60% of the variation in SPR; comparable figures for WRAP are 52% and 47%. Following the completion of the HOST classification in urban areas some revision of the HOST classification scheme is anticipated.

The HOST Classification

SUBSTRATE HYDROGEOLOGY	MINERAL SOILS						PEAT SOILS	
	Groundwater or aquifer	No impermeable or gleyed layer within 100cm	Impermeable layer within 100cm	OR gleyed layer within 40cm	Gleyed layer within 40cm			
Weakly consolidated, microporous, by-pass flow uncommon (Chalk)	Normally present and at >2m	1 (4.31)	12 (0.87)		13 (0.66)		14 (9.93)	
Weakly consolidated, microporous, by-pass flow uncommon (Limestone)		29 (2.12)						
Weakly consolidated, macroporous, by-pass flow uncommon		2 (1.58)						
Strongly consolidated non or slightly porous. By-pass flow common		3 (3.33)						
Unconsolidated, macroporous, by-pass flow very uncommon		4 (5.09)						
Unconsolidated, microporous, by-pass flow common		5 (1.69)						
Unconsolidated, macroporous, by-pass flow very uncommon	Normally present and at <2m	6 (0.78)			IAC* <12.5 [<1m day^{-1}]	IAC* >12.5 [>1m day^{-1}]	*Drained*	*Undrained*
Unconsolidated, microporous, by-pass flow common		7 (1.51)			8 (3.61)	9 (2.74)	10 (0.55)	11(0.48)
Slowly permeable	No significant groundwater or aquifer	15 (0.42)	IAC# >7.5 17 (5.40)	IAC# <7.5 20 (4.02)	23 (13.84)		25 (2.49)	
Impermeable (hard)		16 (10.20)	18 (2.16)	21 (1.10)	(shaded)		26 (0.83)	
Impermeable (soft)		(shaded)	19 (0.69)	22 (1.31)	24 (3.64)		(shaded)	
Eroded Peat		(shaded)	(shaded)	(shaded)	(shaded)		27 (0.59)	
Raw Peat		(shaded)	(shaded)	(shaded)	(shaded)		28 (8.06)	

Also unclassified (urban) areas (0.54%) and lakes (0.54%).
* IAC used to index lateral saturated hydraulic conductivity
\# IAC used to index soil water storage capacity

No extensive UK soil types exist outside the table or within the shaded portions of the diagram.
Large numbers are HOST class numbers.
Numbers in brackets are percentage land cover in England, Wales and Scotland.

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Table 3.2 *Provisional Hydrology of Soil Type (HOST) classification scheme. The illustrated scheme is provisional and was used as the basis of the low flow analysis. The scheme is published with the permission of the HOST project group.*

At the time of the low flow analysis the HOST data base was available in the form of the dominant HOST class in each 1 km square for England, Wales and Scotland, but not for Northern Ireland. Table 3.3 indicates the percentage of England, Wales and Scotland covered by each HOST class, the percentage of the A and B graded gauged catchments covered by each class, and the maximum proportion of the HOST class represented within an A and B gauged catchment. It is anticipated that the proportion of HOST classes in 1 km^2 will become available together with a resolution of the HOST data at a 100 m grid scale.

Table 3.3 *Proportions of HOST classes in Great Britain and within gauged catchments*

	Fraction in Great Britain	Mean fraction in AB graded catchments	Maximum fraction in AB graded catchments
HOST1	4.53	6.18	100.0
HOST2	1.66	1.96	98.68
HOST3	3.50	4.10	77.24
HOST4	5.35	3.90	56.95
HOST5	1.78	1.67	45.83
HOST6	0.83	0.62	32.35
HOST7	1.59	0.50	13.72
HOST8	3.80	0.64	17.27
HOST9	2.88	1.88	24.97
HOST10	0.57	0.22	11.90
HOST11	0.50	0.48	100.00
HOST12	0.91	0.72	25.25
HOST13	0.70	0.46	15.15
HOST14	10.44	9.74	86.67
HOST15	0.44	0.68	32.35
HOST16	10.73	10.49	90.00
HOST17	5.68	6.05	81.00
HOST18	2.27	1.39	50.00
HOST19	0.72	0.95	18.83
HOST20	4.22	5.08	93.48
HOST21	1.15	1.16	50.00
HOST22	1.38	1.29	32.78
HOST23	14.56	14.89	100.00
HOST24	3.82	4.12	65.42
HOST25	2.62	4.71	72.02
HOST26	0.88	0.68	38.54
HOST27	0.62	0.32	39.33
HOST28	8.48	7.71	100.00
HOST29	2.24	3.22	90.69
HOST97	0.57	3.86	97.22
HOST98	0.57	0.34	10.00

3.2.5 FALAKE

The proportion of the catchment covered by a lake or reservoir was calculated from a 1:250,000 scale map. Values of FALAKE are listed in Appendix 3.

3.3 LOW FLOW STUDY DATA BASE

3.3.1 Number of stations and record length

A total of 865 stations have been identified as suitable for inclusion in the Low Flow Study data base, which represents an increase of 327 stations from the 538 stations available in the Low Flow Studies report (Institute of Hydrology, 1980). The selected stations have an average record length of 18.6 years of daily mean flow data, and over 16,000 station years of daily data were analysed.

3.3.2 Low flow statistics

The methods described in Section 3.1 for the calculation of low flow statistics were applied to all gauging stations graded either A or B for hydrometry or degree of artificial influences. The calculated low flow statistics are presented in Appendices 2 and 5. Table 3.4 summarises the calculated flow statistics.

Table 3.4 *Summary of calculated low flow statistics*

	Number of Stns	Mean	Standard deviation	Maximum	Minimum
Q95(1) (% MF)	865	16.9	11.2	72.8	0.0
MAM(7) (% MF)	865	18.5	8.2	82.0	0.0
BFI	865	0.501	0.182	0.982	0.068
Mean flow (mm yr^{-1})	694	662.0	477.0	2703.0	78.0

This Table identifies national average values of the two key low flow statistics to be 16.9% for Q95(1) and 18.5% for MAM(7). Both variables exhibit considerable variability in their observed values, with standard deviations of approximately 10%, and ranging from rivers which are ephemeral with minimum values of 0.0, up to 82% of the mean flow in the case of MAM(7). Figure 3.6 presents a histogram of gauged Q95(1) values, which is moderately positively skewed, with a modal class of 10 - 15% of the mean flow.

The 1980 Low Flow Study used data up to 1975, and this study uses data up to 1989. The mean value of Q95(1) and MAM(7) amongst the stations used in the 1980 Study were both 18% of mean flow respectively while Section 3.3.1 identifies the mean Q95(1) and MAM(7) values to be 16.9% and 18.5%. Figure 3.6 illustrates that the two sets of Q95(1) values exhibit a similar distribution of values. Both the mean and the distribution suggest initially that there has been little change in the average UK values of these two low flow statistics. However, the mean values are not calculated from a common sample of gauging stations, and use of the mean statistic may mask changes over time at individual gauging stations. To investigate changes in gauged Q95 amongst stations common to the two studies, 282 stations were identified with data from at least 1973 to 1989, and graded "Daily" or "Weekly" in 1980 and A or B in this study.

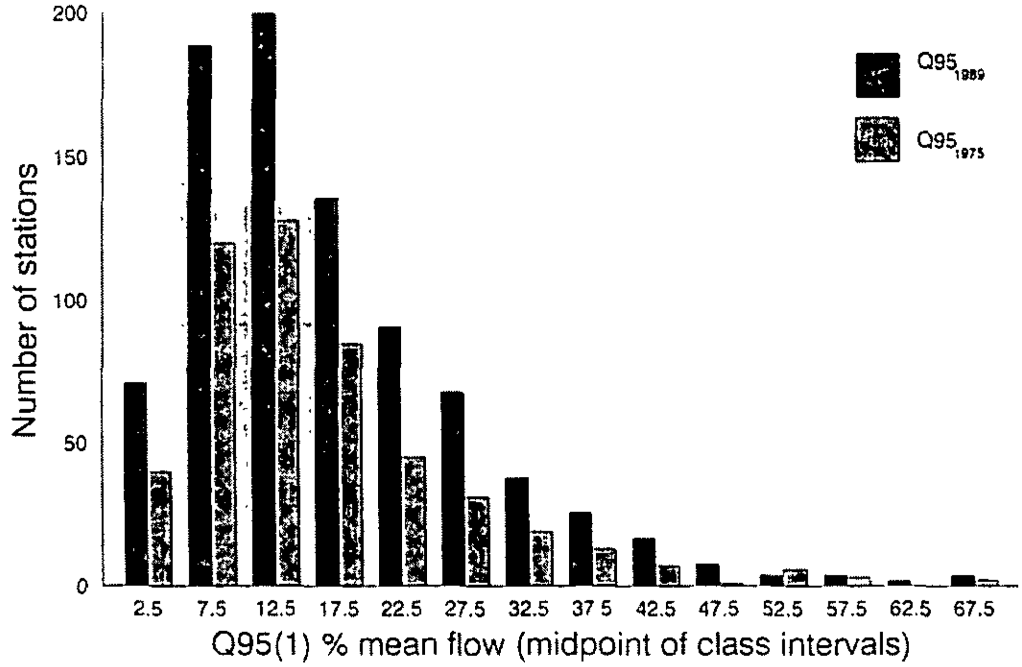


Figure 3.6 *Histogram of gauged Q95(1) values*

Q95(1) was calculated for these stations as follows:

a) Q95(1) from the start year to 1975, termed $Q95_{1975}$

b) Q95(1) from the start year to 1989, termed $Q95_{1989}$

The mean value amongst the 282 stations of $Q95_{1975}$ is 18.3% of mean flow compared with a mean value of $Q95_{1989}$ of 16.5% of mean flow. The difference between the two values, termed $\Delta\ Q95_{1975,1989}$ was calculated as a percentage of $Q95_{1989}$ as follows

$$\Delta\ Q95_{1975,1989} = \frac{Q95_{1989} - Q95_{1975}}{Q95_{1989}} \times 100 \qquad (3.8)$$

The mean value of $\Delta\ Q95_{1975,1989}$ is -14.3, meaning that Q95 values in 1975 were, on average, 14% higher than Q95 values in 1989. A histogram of $\Delta\ Q95_{1975,1989}$ is presented in Figure 3.7.

The largest proportional reduction of Q95(1) is at station 55016 (Ithon at Disserth) where $Q95_{1975}$ of 6.6% of mean flow reduced to 3.5% of mean flow. The largest absolute reduction of Q95(1) is at 27038 (Costa Beck at Gatehouses) where $Q95_{1975}$ of 78.8% of mean flow reduced to 65.2% of mean flow. There is no strong regional pattern to the reduction of Q95(1) values. Although Q95(1) values are generally lower for the period to 1989, 35 of the 282 stations have higher values, with a tendency for these to be located within Anglian and Thames regions.

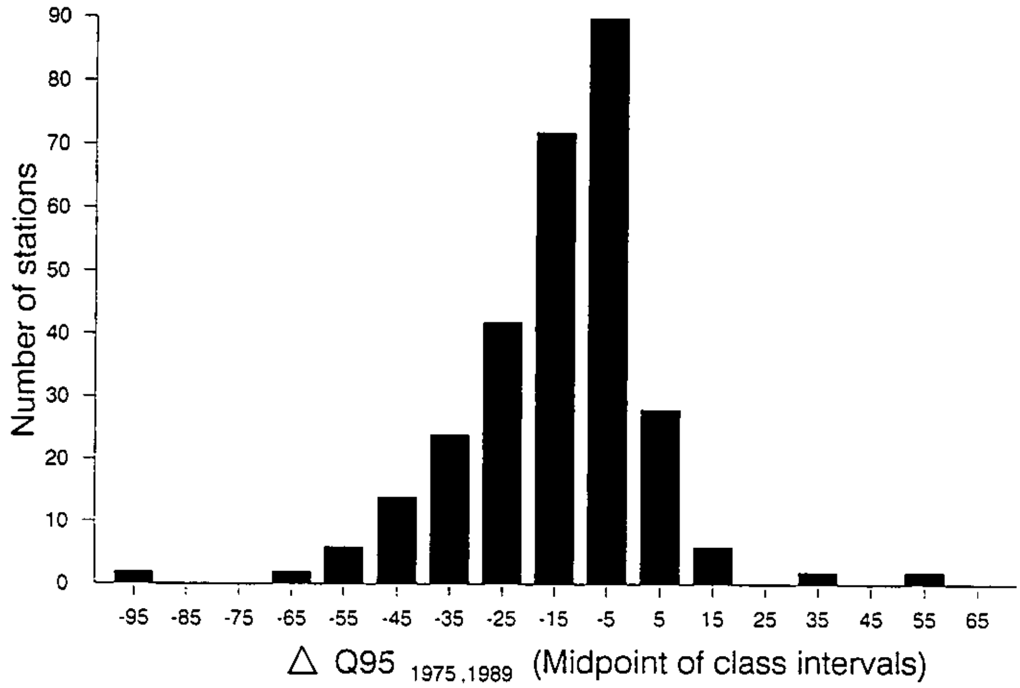


Figure 3.7 *Histogram of differences in Q95(1) calculated from data up to 1975 ($Q95_{1975}$) and up to 1989 ($Q95_{1989}$)*

Arnell *et al.* (1990) discuss recent changes over time of seasonal and annual runoff totals and runoff variability within gauged flow records in the United Kingdom. Appendix 6 investigates the feasibility of calculating standard period low flow statistics to reduce the inconsistencies resulting from flow statistics being derived from different periods of record.

3.3.3 Catchment characteristics

The methods described in Section 3.2 for the calculation of catchment characteristics were applied to the same catchments as described in Section 3.3.1. The calculated catchment characteristics are presented in Appendix 3. Table 3.5 presents a summary of the calculated catchment characteristics.

Table 3.5 Summary of calculated catchment characteristics

	Mean	Standard deviation	Maximum	Minimum
AREA km^2	283.5	627.6	8231.0	0.6
SAAR mm	1122.0	480.0	3449.0	559.0
PE mm	462.6	61.9	554.0	290.0
FALAKE	0.003	0.010	0.092	0.0

Comparison of the sampled catchment characteristic values with those for gauging stations used in the Low Flow Studies report (Institute of Hydrology, 1980) identify similar distributions for all variables. Essentially, more catchments are included in the analysis set, but they represent the same types of catchment in terms of catchment properties.

In summary, the data base used in this report comprises calculated low flow statistics and catchment characteristics for 865 gauging stations. This represents one of the largest data bases assembled for a national study of low flows, with only the United States study of 1666 stations (Thomas and Olson, 1992) analysing more catchments. Minor changes can be identified within gauged Q95(1) values at gauging stations between the 1980 Low Flow Studies report and this report. However, the mean value and the sampled variability of the low flow statistics, and indeed of the catchment characteristics, are essentially the same. Improvements in the estimation procedure can therefore be attributed to the benefits of larger data sets, longer records, and the use of improved catchment characteristics.

4 Estimation of mean flow, Q95(1) and MAM(7) at ungauged sites

4.1 MEAN FLOW

Estimates of mean flow are required both as a general measure of available resource and as a scale variable for converting low flows which are expressed as a percentage of the mean flow to an absolute figure in cumecs.

Two procedures are described for the estimation of the mean flow: a revision of the Low Flow Studies catchment water balance procedure (Section 4.1.1) and a regional regression procedure (Section 4.1.2).

4.1.1 Catchment water balance

Average annual runoff depth (AARD) can be assumed to be the difference between average annual rainfall (SAAR) and losses. A catchment value of SAAR is estimated from the Standard period (1941-1970) average annual rainfall map and Potential evaporation (PE) from a map of average annual potential evaporation (provisional version) based on the Penman equation. Losses are estimated from PE by

$$\text{Losses} = r * PE$$

where the adjustment factor r is a function of catchment rainfall. Table 4.1 presents values of r for given values of SAAR from the Low Flow Studies Report (Institute of Hydrology, 1980), which were derived from stations with more than ten years of gauged data and by consideration of the evaporation process.

Table 4.1 *Low Flow Studies report (1980) adjustment factor for estimating actual evaporation*

	SAAR (mm)						
	500	600	700	800	900	1000	>1100
r	0.88	0.90	0.92	0.92	0.94	0.96	1.00

Table 4.1 can be expressed by the equations

$$\begin{aligned} r &= 0.0002\,SAAR + 0.78 && \text{for } r = < 1.0 \\ r &= 1.0 && \text{for } SAAR = > 1100 \text{ mm} \end{aligned} \qquad (4.1)$$

The value of r increases with SAAR and hence increasing water availability. For catchments with average annual rainfall in excess of 1100mm it is assumed that actual evaporation is equal to potential as a result of relatively short periods when evaporation will be limited by soil moisture deficit.

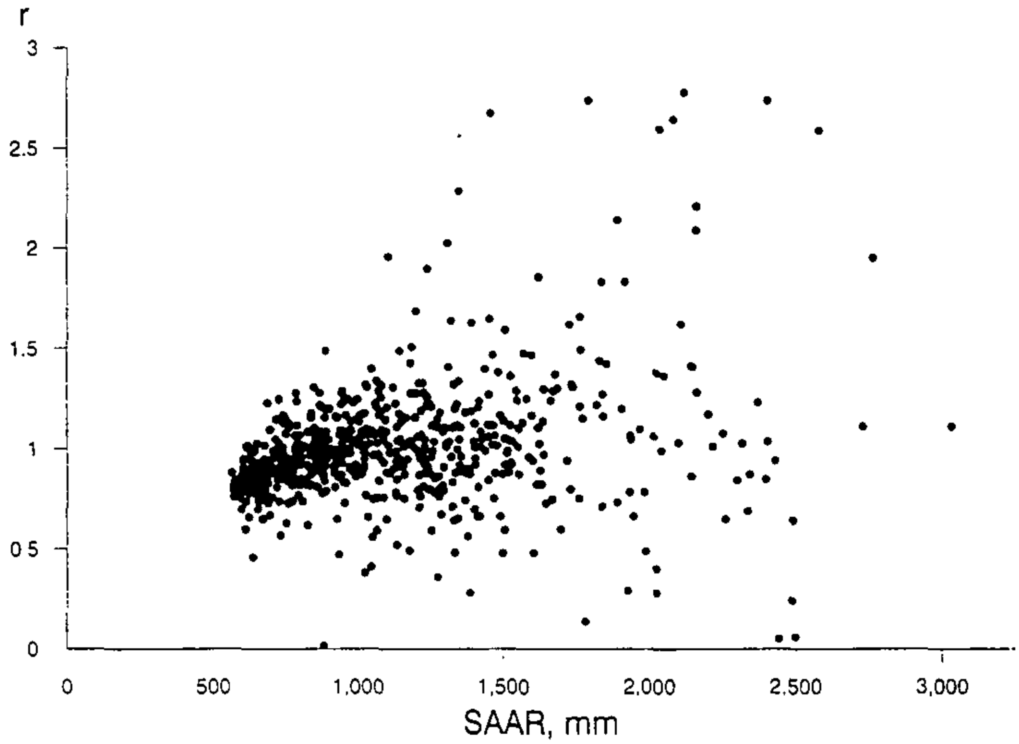


Figure 4.1 *National relationship of r against SAAR*

Figure 4.1 presents the relationship for 687 catchments of r against SAAR derived from the AARD calculated in this report by conversion into mm from observed mean flow in $m^3 s^{-1}$, which displays a wide scatter in the relationship. Possible reasons for the scatter include:

- artificial influences affecting the gauged mean flow (the station assessment scheme was designed to assess influence on low flows expressed as a percentage of the mean flow)
- errors in precipitation, evaporation and flow estimates leading to large errors in the calculation of r
- the use of period-of-record discharge data but standard period (1941-1970) rainfall
- the assumption of a water balance which may be violated by regional groundwater flow or local leakage of water bypassing the gauging station
- the influence of land use, for example increased losses (and hence lower r values) as a result of increased evaporative losses from intercepted water on coniferous forests, and catchments dominated by cereal crops which may result in higher r values due to mean losses being lower than the mean potential rate for grass.

Following an analysis of the data, seven stations with anomalous rainfall and/or runoff data or differences between topographic and groundwater boundaries were removed from the analysis.

Errors in the 1980 methodology can be expressed as the bias between predicted mean flow (MF_{pred}) and observed mean flow (MF_{obs}), where the bias B is calculated for each station as

$$B = \frac{MF_{pred}}{MF_{obs}} \times 100 \qquad (4.2)$$

Analysis of the relationship between r and SAAR identifies first that the 1980 Low Flow Study r values are too high for low values of SAAR, and second that the threshold of SAAR = 1100mm at which r = 1.00 is too high. Consequently, applying the 1980 Low Flow Study method tends to underestimate mean flow (B < 100) in regions of low rainfall, and overestimate (B > 100) mean flow in regions with SAAR of approximately 800mm to 1100mm as illustrated in Figure 4.2. The mean bias amongst the 687 catchments is 102.2, that is on average the predicted mean flow is only 2% higher than the observed mean flow. When predicting the mean flow, the 1980 methodology has a factorial standard error of estimate of 1.24.

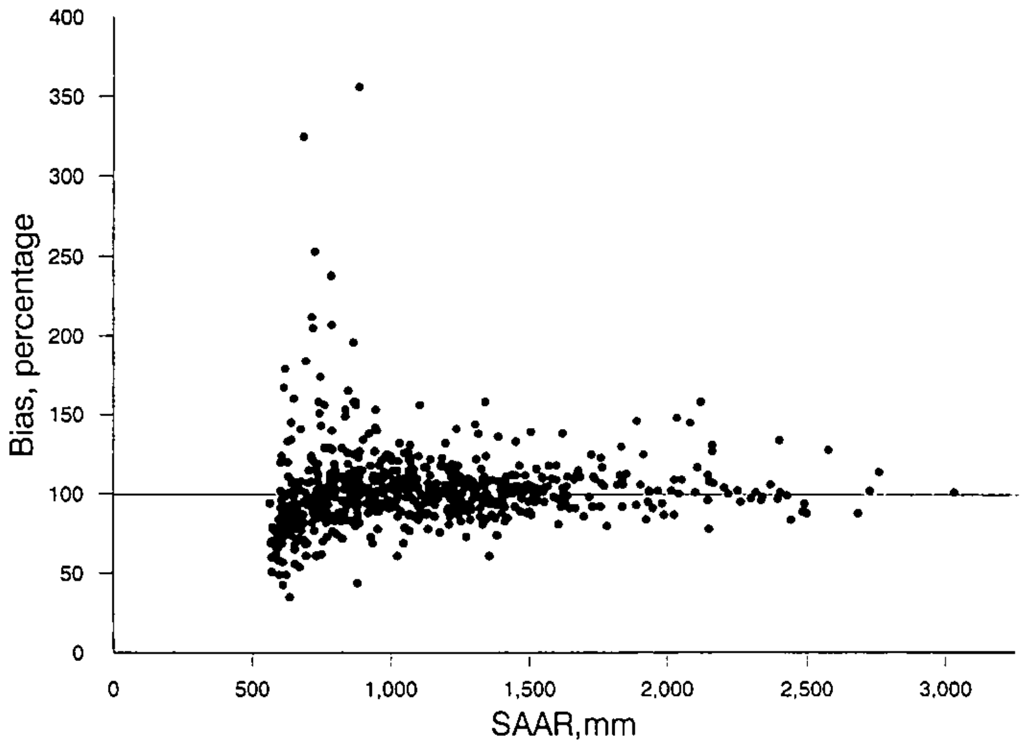


Figure 4.2 *Bias in the estimation of mean flow by the Low Flow Studies (1980) catchment water balance methodology*

Recalibration of the catchment water balance methodology establishes a new relationship between r and SAAR, which can be expressed as

$$\begin{aligned} r &= 0.00061\,SAAR + 0.475 && \text{for } r = < 1.0 \\ r &= 1.0 && \text{for } SAAR = > 850 \text{ mm} \end{aligned} \qquad (4.3)$$

Table 4.2 *Comparison of factorial standard error of estimates of mean flow for subsets of area and rainfall*

Data set	Number of stations	1980 report	This report
All	687	1.24	1.22
AREA (km^2)			
< 100	276	1.30	1.28
100-500	316	1.20	1.19
500-1000	49	1.11	1.09
> 1000	46	1.15	1.14
SAAR (mm)			
< 1000	346	1.31	1.28
> 1000	341	1.14	1.14

Although the mean bias value is marginally higher at 103.6, the factorial standard error of estimates of mean flow is reduced to 1.22. Calculation of the bias, B, for the revised water balance methodology, established that the underestimation of mean flow for low SAAR values, and overestimation in the range of SAAR between 800mm - 1100mm, has been reduced in comparison with the 1980 methodology, although not eliminated.

Table 4.2 compares the factorial standard error for subsets of area and rainfall between the two calibrations of the catchment water balance method, and illustrates that in general errors are higher for small, dry catchments but these errors are reduced by the new calibration. The mean f.s.e. of 1.22 compares with the median CV of annual runoff of 0.23 (Arnell *et al.* 1990) for U.K. catchments. Thus, the f.s.e. of estimating the mean flow from one year of flow data is of the order of 1.23, assuming no errors in flow measurement. This is of the same magnitude as estimating the mean flow from mapped rainfall and evaporation.

4.1.2 Regional regression equations

An alternative approach for estimating the mean flow is to derive a regression equation between the mean flow and catchment characteristics. The following equation was based on 687 catchments with at least six years of data.

$$MF = 2.70\ 10^{-7}\ AREA^{1.02}\ SAAR^{1.82}\ PE^{-0.284}$$

$$R^2 = 0.977$$
$$f.s.e. = 1.25$$

This was then compared with the water balance method which, when expressed in the same units ($m^3\ s^{-1}$), had an equivalent R^2 of 0.981 and f.s.e. of 1.22. Given the conceptual advantages of the water balance approach, its lower error and ability to incorporate local data, that method is preferred. Furthermore, Arnell *et al.* (1990) found that parameters of regression models for estimating mean flow were sensitive to the set of stations used in the analysis.

4.2 FLOW DURATION CURVE: 95 PERCENTILE AND MEAN ANNUAL 7 DAY MINIMUM

The percentage coverage of the 29 HOST classes and Urban (97) and Lake (98) for each of the 865 low flow catchments were derived using the digitised catchment boundary and HOST data bases described in Section 3.2. Linear least squares multiple regression analysis was used to relate Q95(1) and MAM(7) to the percent coverage of HOST classes. Only a draft HOST data base was available for Northern Ireland so data from Northern Ireland was not used in the analysis. Because different missing data criteria were used different data sets were available for the Q95(1) calibration (694 stations) compared with the MAM(7) analysis (660 stations). Gauging stations with catchment areas of less than 5 km^2 were omitted because of the possibility of introducing errors in small catchments by using the dominant HOST class within 1 km^2 grids. The estimated Q95(1) and MAM(7) parameters for the HOST classes are presented in Table 4.3 and Table 4.4 respectively. Table 3.3 shows the proportions of HOST classes within gauged catchments and the maximum percentages. The poor representation of certain HOST classes was reflected in the results of the regression analysis with very high standard errors in parameter estimates of Q95(1) and MAM(7). For example, the highest standard errors of the Q95(1) parameters are associated with HOST classes 7 and 10, both of which represent less than 15% coverage at their maximum occurrence within gauged catchments. Furthermore, negative parameters are estimated for HOST classes 21, 22, 24 and 26 for both Q95(1) and MAM(7), and additionally for HOST class 8 for Q95(1).

Table 4.3 *Q95(1) estimates for HOST classes*

HOST class	Q95(1) Parameter	s.e. of Parameter	HOST class	95(1) Parameter	s.e. of Parameter
1	37.7	1.8	17	14.5	2.8
2	68.8	4.4	18	24.6	9.4
3	26.4	3.2	19	31.4	20.1
4	56.4	4.9	20	12.3	2.2
5	31.6	8.6	21	-3.0	15.2
6	4.8	14.3	22	-12.9	9.1
7	30.0	32.7	23	7.7	1.5
8	-4.3	23.7	24	-2.5	4.3
9	13.2	12.4	25	9.8	3.4
10	44.3	41.0	26	-8.5	11.0
11	16.6	19.2	27	24.7	12.5
12	95.8	15.7	28	5.8	2.7
13	5.4	19.9	29	32.7	2.9
14	12.7	2.6	97	29.9	2.3
15	26.8	13.5	98	78.3	28.9
16	12.3	2.3			

$R^2 = 0.565$
Standard error = 7.633

The regression analysis also identified that HOST classes with similar soil and hydrogeological characteristics with respect to their low flow response possess similar parameter estimates. It was thus decided to group the HOST classes into a smaller number of low flow response units. These units were combinations of HOST classes with similar

Table 4.4 MAM(7) estimates for HOST classes

HOST class	MAM(7) Parameter	s.e. of Parameter	HOST class	MAM(7) Parameter	s.e. of Parameter
1	47.6	2.0	17	19.6	3.1
2	74.8	5.0	18	25.7	10.5
3	29.0	3.6	19	41.0	22.4
4	63.7	5.4	20	13.6	2.5
5	30.4	9.6	21	-12.0	17.0
6	6.3	15.9	22	-17.7	10.2
7	21.4	36.5	23	8.0	1.7
8	1.2	26.4	24	-4.3	4.8
9	3.6	13.9	25	9.9	3.8
10	26.3	45.8	26	-12.7	12.3
11	15.2	21.4	27	27.7	13.9
12	103.6	17.5	28	5.5	3.1
13	14.0	22.2	29	41.5	3.2
14	11.4	2.9	97	34.5	2.5
15	13.2	15.1	98	66.1	32.2
16	15.3	2.6			

$R^2 = 0.602$
Standard error = 8.517

physical characteristics and in some cases these were supported by the results of the regression analysis. A number of different strategies of groupings were investigated and the final assignment of 29 HOST classes to ten Low Flow HOST Groups (LFHG) is shown in Table 4.5. The final assignment of HOST classes to groups is based principally, but not exclusively, upon hydrogeological class. The URBAN (HOST 97) and LAKE (HOST 98) fractions are assigned to individual Low Flow HOST Groups 11 and 12 respectively. Figure 4.3 displays the general distribution of Low Flow HOST Groups in Great Britain based on the dominant HOST class within grid squares of 1 km^2.

Table 4.6 presents proportions of the Low Flow HOST Groupings within gauged catchments in the United Kingdom, and the maximum proportion within those gauged catchments.

Tables 4.7 and 4.8 identify the complex links between Low Flow HOST Groupings and Hydrogeological units. Only two Low Flow Groups contain unique hydrogeological units; soft limestones in LFHG2 and very soft massive clays in LFHG8. Otherwise, Low Flow HOST Groups contain several hydrogeological units (up to 15 different units in the case of LFHG6). Ten hydrogeological units are assigned to a single Low Flow HOST Group otherwise the same unit occurs in different Low Flow HOST Groups (e.g. soft sandstone occurs in 4 different Groups).

Using linear least squares multiple regression, Q95(1) and MAM(7) were regressed against the proportional extent of the 12 Low Flow HOST Groupings. Standard errors of parameters are significantly reduced compared with the analysis based on 29 individual HOST classes, no negative parameters are calculated and parameter estimates differ significantly from each other in broad terms.

An analysis of residuals using these relationships identified that there are major differences between the observed and predicted low flow statistics for catchments 26004 and 26005.

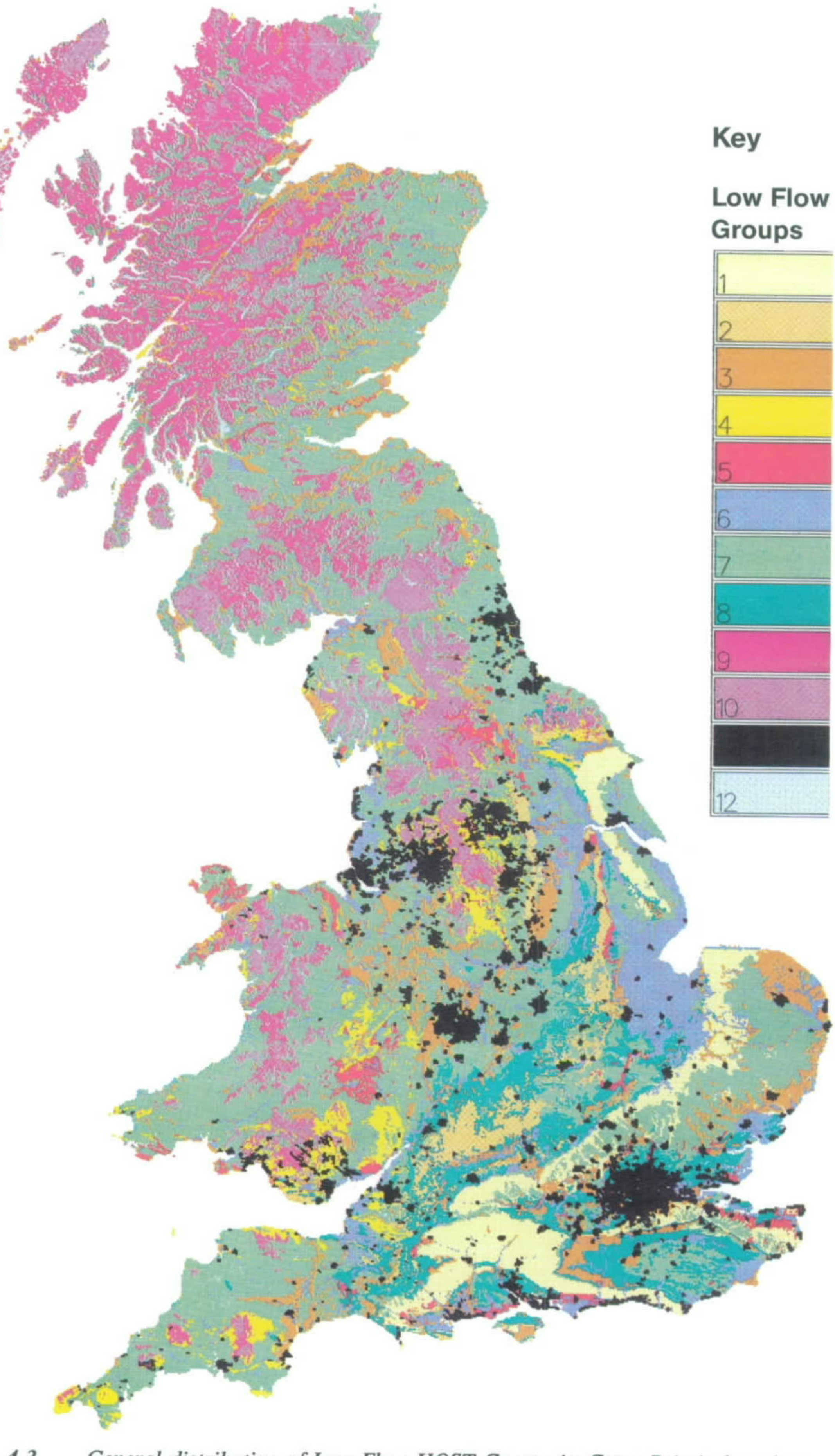


Figure 4.3 *General distribution of Low Flow HOST Groups in Great Britain based on the dominant HOST class in each 1 km² derived by the HOST project*

Table 4.5 *Assignment of HOST classes to Low Flow HOST Groups*

LOW FLOW HOST GROUP	CONSTITUENT HOST CLASSES
LFHG1	HOST 1
LFHG2	HOST 29
LFHG3	HOST 2, HOST 4
LFHG4	HOST 3
LFHG5	HOST 5, HOST 12
LFHG6	HOST 6, HOST 7, HOST 8, HOST 9, HOST 10
LFHG7	HOST 13, HOST 15, HOST 16, HOST 17, HOST 18, HOST 20, HOST 21, HOST 23
LFHG8	HOST 19, HOST 22, HOST 24
LFHG9	HOST 14
LFHG10	HOST 11, HOST 25, HOST 26, HOST 27, HOST 28
LFHG11	HOST 97
LFHG12	HOST 98

Table 4.6 *Proportions of Low Flow HOST Groupings in Great Britain and within gauged catchments*

Low Flow HOST Group	Mean fraction in Great Britain	Mean fraction in AB graded catchments	Maximum fraction in AB graded catchments
LFHG1	4.53	6.18	100.00
LFHG2	2.24	3.22	90.69
LFHG3	7.01	5.86	98.68
LFHG4	3.50	4.10	77.24
LFHG5	2.69	2.39	45.83
LFHG6	9.67	3.87	37.76
LFHG7	39.75	40.19	100.00
LFHG8	5.92	6.37	95.00
LFHG9	10.44	9.74	86.67
LFHG10	13.10	13.91	100.00
LFHG11	0.57	3.86	97.22
LFHG12	0 57	0.34	10.00

Table 4.7 Constituent hydrogeological units of Low Flow HOST Groupings

Low Flow HOST Grouping	Description of Hydrogeological Units	
LFHG1	3 Chalk, chalk rubble 23 Clay with flints or plateau drift 26 Chalky drift	
LFHG2	4 Soft Magnesian, brashy or Oolitic limestone and ironstone	
LFHG3	1 Soft sandstone, weakly consolidated sand 19 Blown Sand	24 Gravel 34 Sand
LFHG4	2 Weathered/fissured intrusive/metamorphic rock 5 Hard fissured limestone	13 Hard fissured sandstone
LFHG5	1 Soft sandstone, weakly consolidated sand 2 Weathered/fissured intrusive/metamorphic rock 3 Chalk, chalk rubble 4 Soft Magnesian, brashy or Oolitic limestone and ironstone	13 Hard fissured sandstone 18 Colluvium 20 Cover loam 25 Loamy drift 26 Chalky drift
LFHG6	1 Soft sandstone, weakly consolidated sand 2 Weathered/fissured intrusive/metamorphic rock 3 Chalk, chalk rubble 7 Hard but deeply shattered rocks 14 Earthy peat 15 River alluvium 16 Marine alluvium	17 Lake marl or tufa 19 Blown sand 20 Coverloam 22 Till, compact head 24 Gravel 25 Loamy drift 26 Chalky drift 34 Sand
LFHG7	2 Weathered/fissured intrusive/metamorphic rock 6 Hard coherent rocks 7 Hard but deeply shattered rocks 8 Soft shales with subordinate mudstones and siltstones 9 Very soft reddish blocky mudstones (marls) 11 Very soft bedded loams, clays and sands 12 Very soft bedded loam/clay/sands with subordinate sandstone 18 Colluvium	20 Coverloam 21 Glaciolacustrine clays and silts 22 Till, compact head 23 Clay with flints or plateau drift 25 Loamy drift 27 Disturbed ground 35 Cryogenic
LFHG8	10 Very soft massive clays	
LFHG9	1 Soft sandstone, weakly consolidated sand 2 Weathered/fissured intrusive/metamorphic rock 5 Hard fissured limestone 7 Hard but deeply shattered rocks	13 Hard fissured sandstones 18 Colluvium 24 Gravel 25 Loamy drift
LFHG10	2 Weathered/fissured intrusive/metamorphic rock 15 River alluvium 19 Blown sand	24 Gravel 44 Raw peat
LFHG11	Unsurveyed/Urban	
LFHG12	Lake	

Table 4.8 HOST Classes and Low Flow HOST Groups assigned to Hydrogeological Units

	Hydrogeological unit	HOST classes	LFH Groups
1	Soft sandstone, weakly consolidated sand	2, 9, 12, 14	3, 6, 5, 9
2	Weathered/fissured intrusive/metamorphic rock	3, 8, 11, 12, 13, 14	4, 6, 10, 5, 7, 9
3	Chalk, chalk rubble	1. 8. 12	1, 6, 5
4	Soft Magnesian, brashy or Oolitic limestone and ironstone	12, 29	5, 2
5	Hard fissured limestone	3, 14	4, 9
6	Hard coherent rocks	18, 21, 26	7, 10
7	Hard but deeply shattered rocks	7, 8, 14, 16	6, 7, 9
8	Soft shales with subordinate mudstones and siltstones	17, 20, 23, 25	7, 10
9	Very soft reddish blocky mudstones (marls)	17, 20, 23	7
10	Very soft massive clays	19, 22, 24	8
11	Very soft bedded loams, clays and sands	15, 17, 23	7
12	Very soft bedded loam/clay/sands with subordinate sandstone	15, 17, 23, 25	7, 10
13	Hard fissured sandstones	3, 12, 14	4, 5, 9
14	Earthy peat	10	6
15	River alluvium	7, 8, 9, 11	6, 10
16	Marine alluvium	7, 8, 9	6,
17	Lake marl or tufa	9	6
18	Colluvium	5, 13, 14, 16	5, 7, 9
19	Blown sand	4, 6, 9, 11	3, 6, 10
20	Coverloam	5, 7, 8, 9, 12, 13	5, 6, 7
21	Glaciolacustrine clays and silts	17, 23, 25	7, 10
22	Till, compact head	8, 15, 17, 20, 23, 25	6, 7, 10
23	Clay with flints or plateau drift	1, 17, 23, 25	1, 7, 10
24	Gravel	4, 5, 8, 9, 11, 14	3, 6, 9, 10
25	Loamy drift	5, 7, 8, 9, 12, 13, 14, 16	5, 6, 7, 9
26	Chalky drift	1, 7, 9, 12	1, 5, 6
27	Disturbed ground	20, 23	7
34	Sand	4, 6, 9	3, 6
35	Cryogenic	16	7
36	Scree		
43	Eroded blanket peat	27	10
44	Raw peat	11, 28	10
50	Unsurveyed/urban	97	11
51	Lake	98	12

Both gauging stations are on the Gypsey Race, a bourne stream draining the Yorkshire Wolds, and are controlled by fluctuating groundwater levels and cease to flow each summer when levels fall below that of the channel bed.

In the final analyses, these two catchments were omitted from the regional calibration of the Low Flow HOST Groups resulting in minor changes in the parameter estimates and a significant reduction in the overall error of the estimation procedure. The final parameter estimates for Q95(1) and MAM(7) are presented in Tables 4.9 and 4.10. Appendix 4 contains estimated Q95(1) and MAM(7) for each soil association in England, Wales and Scotland, calculated from the percentage area of soil series, and thence HOST and Low Flow HOST Group within each association. For Northern Ireland values of low flow parameters are shown for each of the HOST classes for use with the provisional HOST map of the province. Figures 4.4 and 4.5 display the general distribution of the estimated Q95(1) and MAM(7) statistics for 1 km^2 grid squares throughout Great Britain. These maps are based on the fractions of soil series within grid squares, which have been assigned to HOST classes and then Low Flow HOST Groups for which Q95(1) and MAM(7) estimates are made.

Table 4.9 Final Q95(1) estimates for Low Flow HOST Groups

Low flow HOST grouping	Q95(1) Parameter	s.e. of Parameter
LFHG1	40.8	1.7
LFHG2	31.9	2.6
LFHG3	65.7	2.9
LFHG4	25.0	3.0
LFHG5	49.0	6.8
LFHG6	6.5	5.6
LFHG7	10.7	0.8
LFHG8	1.1	2.0
LFHG9	15.0	2.2
LFHG10	6.8	1.5
LFHG11	29.4	2.1
LFHG12	65.1	25.8

$R^2 = 0.573$
Standard error = 7.427

Figures 4.6 and 4.7 present relationships between observed and predicted values of Q95(1) and MAM(7) respectively, using the final parameters. Figures 4.8 and 4.9 display the spatial distribution of residuals, the standardised difference between observed and predicted values.

The characteristics of catchments with high positive (under-estimation) and negative (over-estimation) were investigated to determine any factors which might explain their distribution. In geographical terms, high positive residuals cluster in the Spey catchment of North East River Purification Board and in the Thames catchment. The ten largest residuals with negative and positive signs are presented in Tables 4.11 and 4.12 respectively.

Table 4.10 Final MAM(7) estimates for Low Flow HOST Groups

Low flow HOST grouping	MAM(7) Parameter	s.e. of Parameter
LFHG1	50.8	1.9
LFHG2	40.3	2.8
LFHG3	71.3	3.3
LFHG4	27.5	3.3
LFHG5	53.4	7.5
LFHG6	1.4	6.2
LFHG7	12.4	0.9
LFHG8	0.1	2.3
LFHG9	14.4	2.4
LFHG10	5.9	1.7
LFHG11	33.8	2.4
LFHG12	49.6	28.7

R^2 = 0.614
Standard error = 8.253

Table 4.11 Identification of ten largest negative residuals from the estimation of Q95(1)

Rank	Station	River	Observed Q95(1)	Predicted Q95(1)	Dominant HOST	Dominant Low Flow HOST Group
1	33032	Heacham	26.2	48.9	1	1
2	56007	Senni	9.3	30.5	4	3
3	27066	Blackburn Brook	6.0	26.8	97	11
4	33029	Stringside	15.9	35.6	1	1
5	39096	Wealdstone Brook	8.8	27.9	97	11
6	39101	Aldbourne	20.0	39.7	1	1
7	42001	Wallington	6.5	26.7	1	1
8	42006	Meon	21.0	40.6	1	1
9	32016	Willow Brook	3.9	21.1	97	11
10	39042	Leach	11.7	28.3	29	2

Table 4.12 Identification of ten largest positive residuals from the estimation of Q95(1)

Rank	Station	River	Observed Q95	Predicted Q95	Dominant HOST	Dominant Low Flow HOST Group
1	27038	Costa Beck	65.2	29.3	3	4
2	43014	East Avon	58.4	29.3	1	7
3	38030	Beane	46.5	20.8	20	7
4	39022	Loddon	43.3	17.3	1	8
5	27058	Riccal	42.7	17.7	14	9
6	42007	Alre	65.7	40.9	1	1
7	8011	Livet	33.8	11.1	14	7
8	38003	Mimram	46.3	26.2	1	7
9	9005	Allt Deveron	29.1	10.5	16	10
10	42010	Itchen	57.2	40.2	1	1

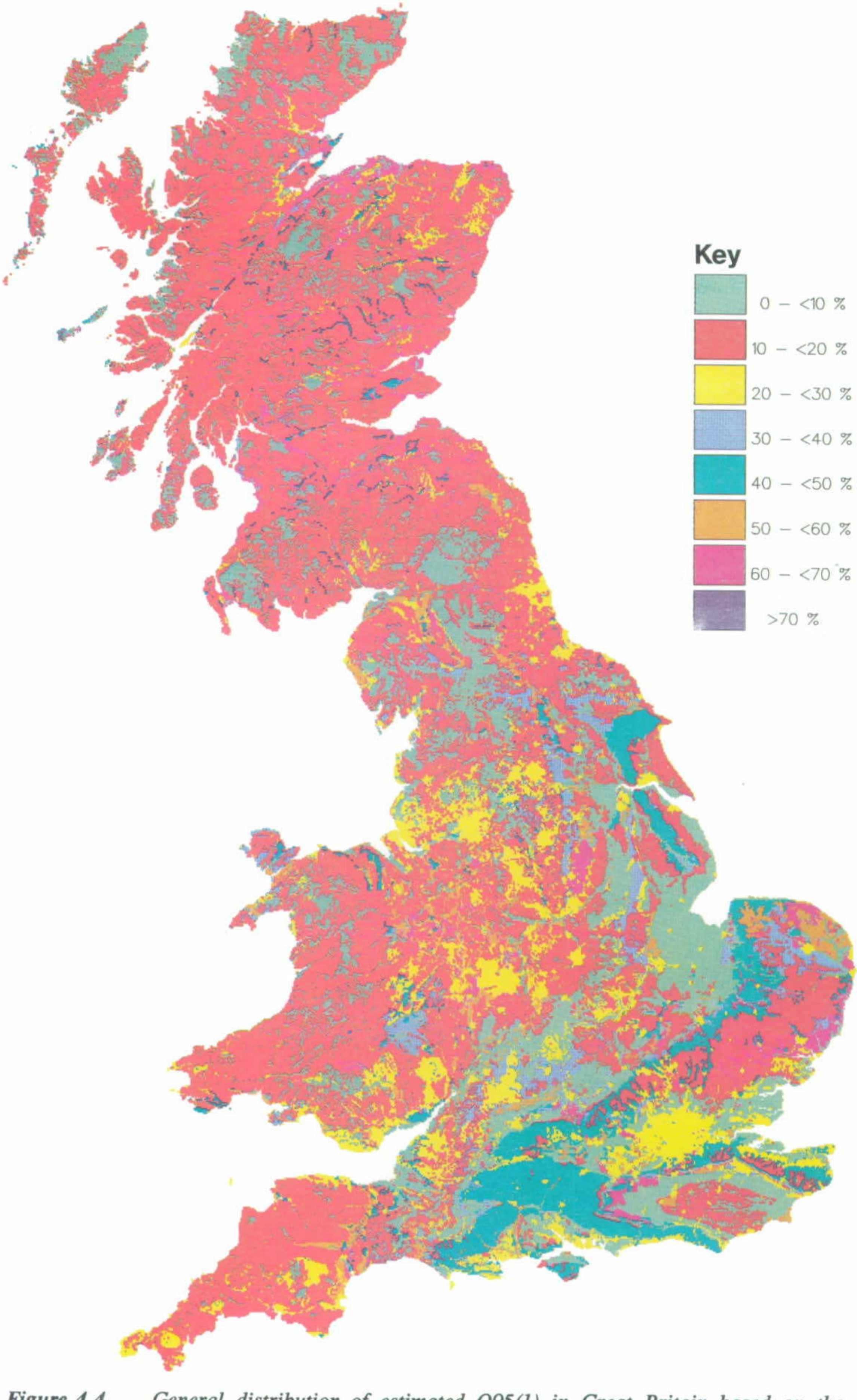


Figure 4.4 *General distribution of estimated Q95(1) in Great Britain based on the proportion of HOST class in each 1 km² derived by the HOST project group*

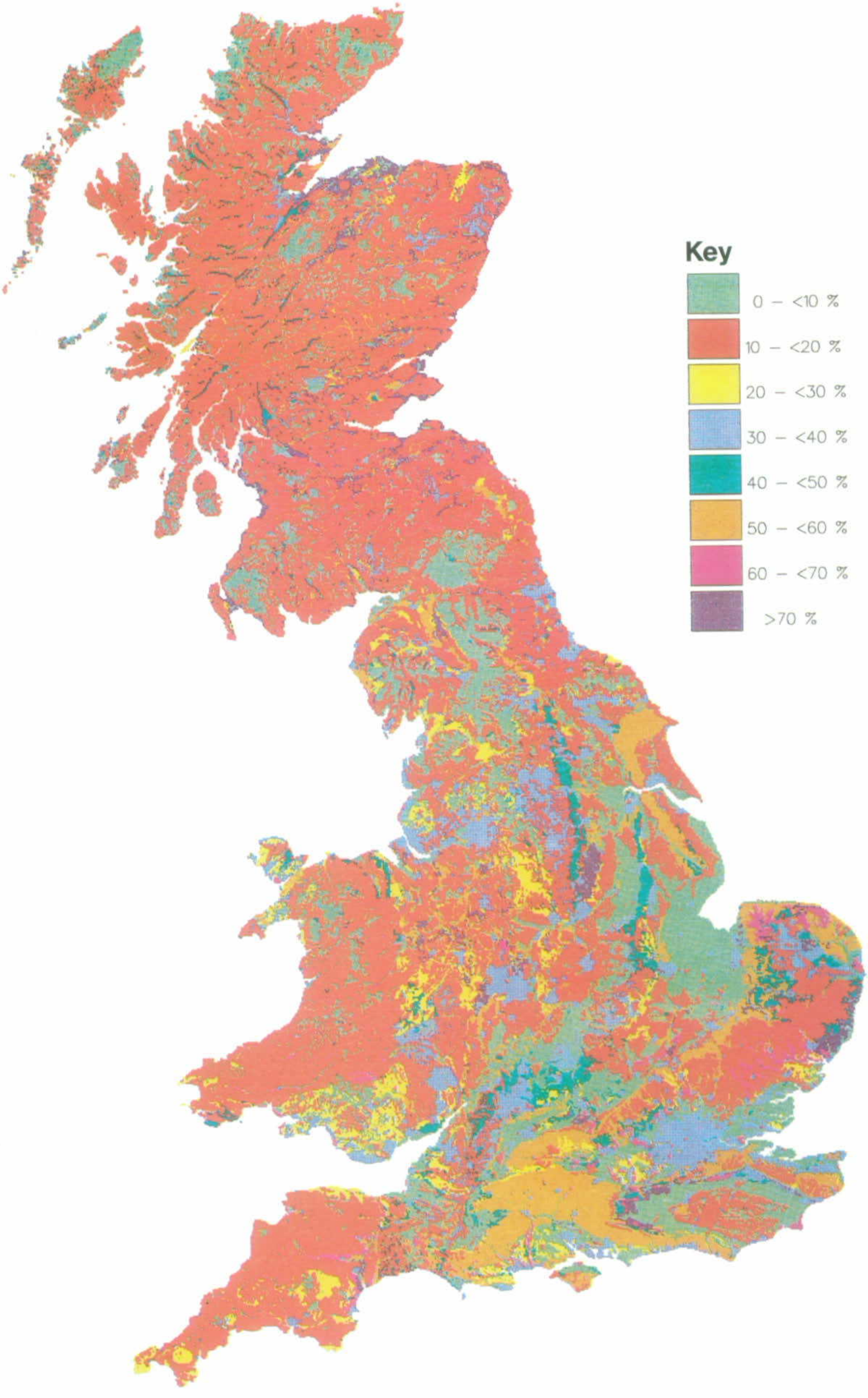


Figure 4.5 *General distribution of estimated MAM(7) in Great Britain based on the proportion of HOST class in each 1 km² derived by the HOST project group*

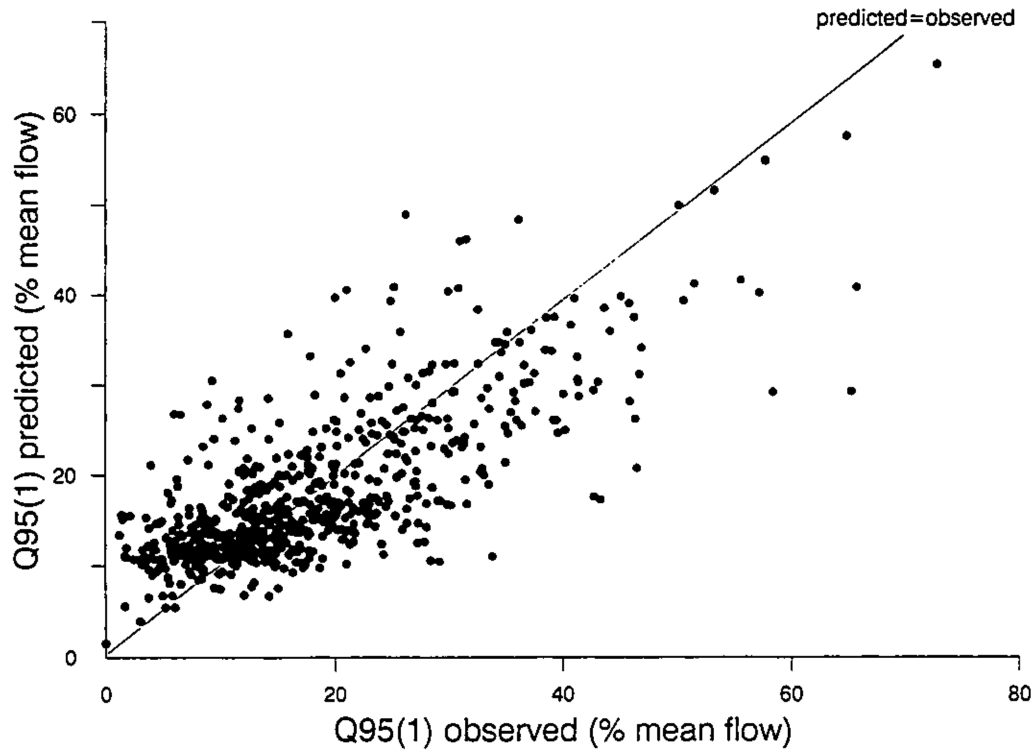


Figure 4.6 *Observed Q95(1) against predicted Q95(1) using final Low Flow HOST Group estimates*

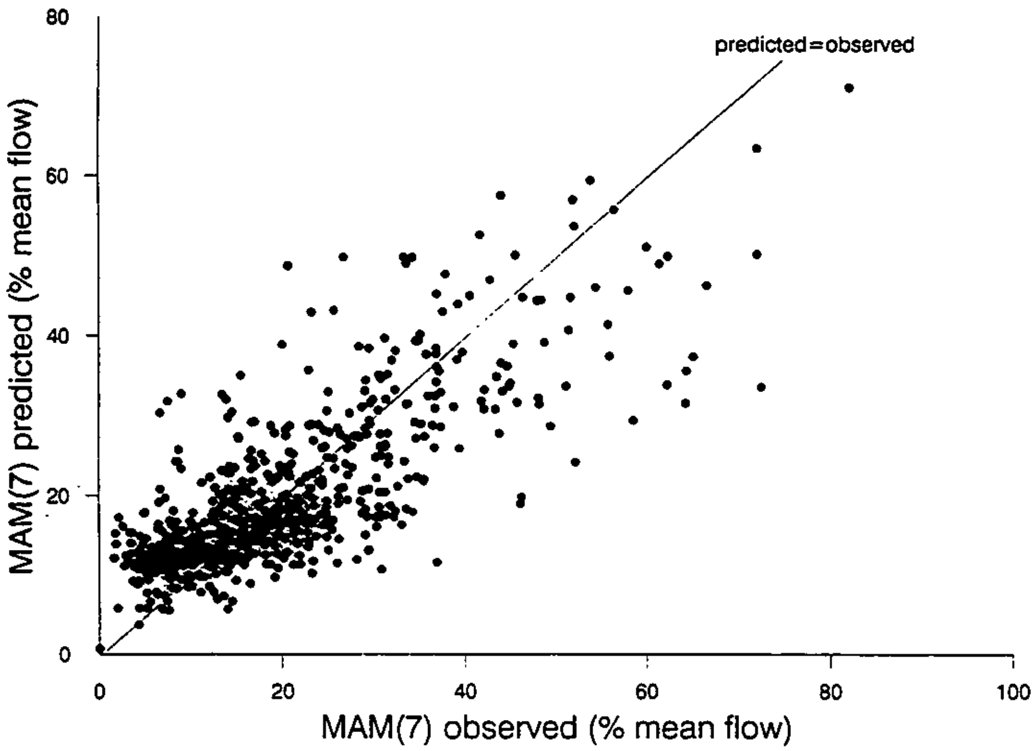


Figure 4.7 *Observed MAM(7) against predicted MAM(7) using final Low Flow HOST Group estimates*

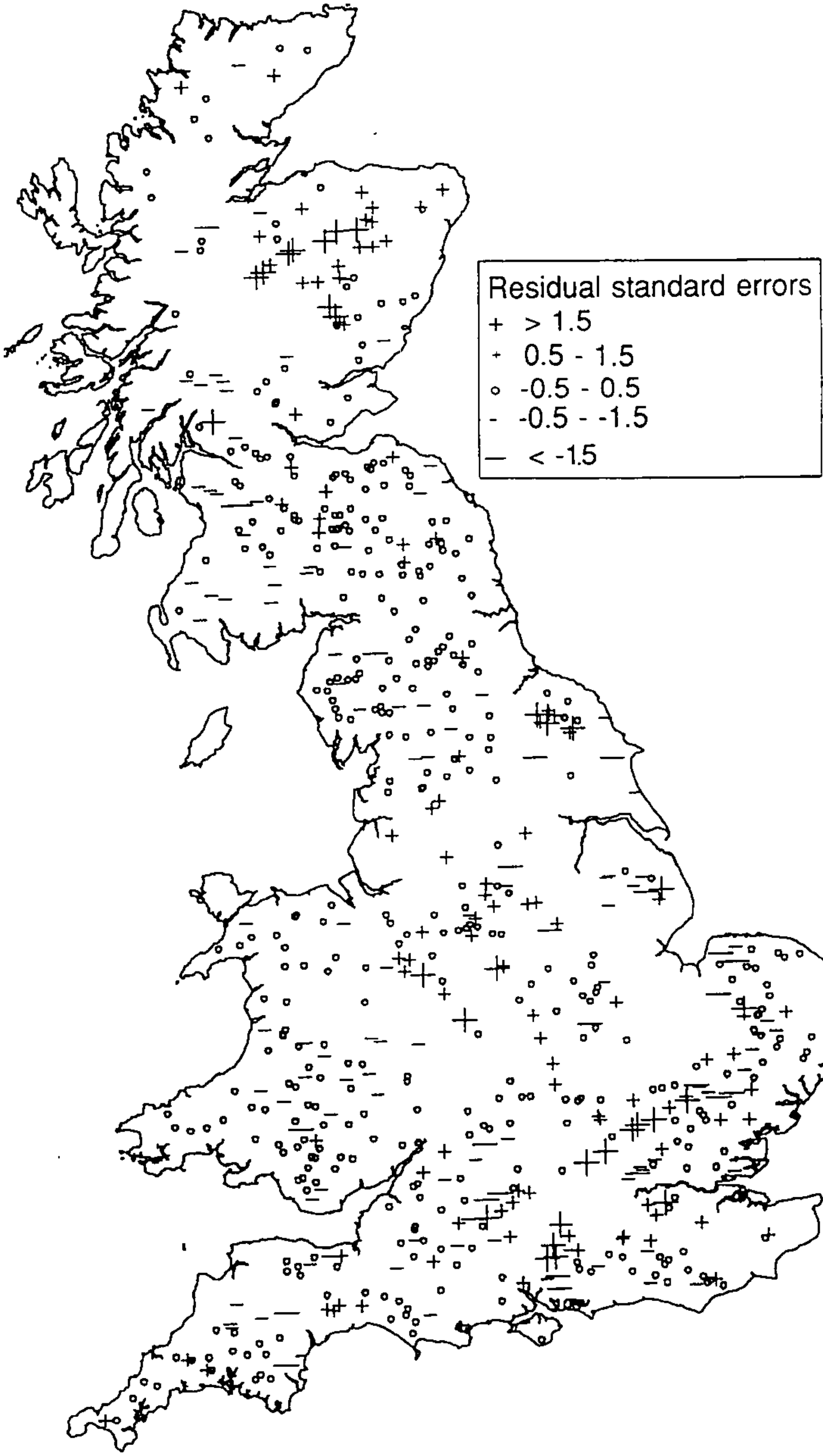


Figure 4.8 *Spatial distribution of Q95(1) residuals*

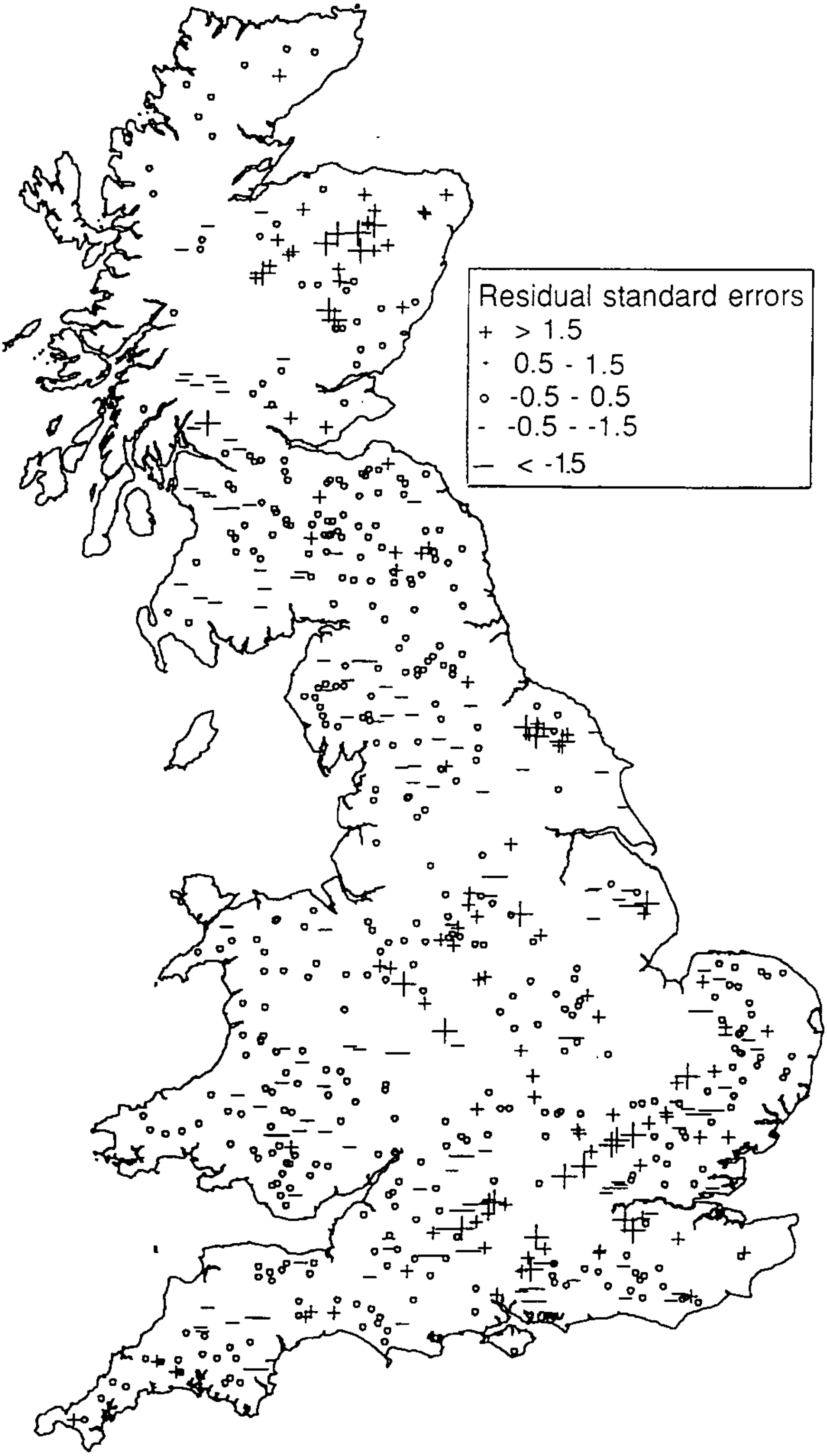


Figure 4.9 *Spatial distribution of MAM(7) residuals*

Catchments with the largest negative residuals are generally dominated by either Low Flow HOST Group 1 (Chalk geology) or Group 11 (urban areas). These Group 1 catchments represent typical Chalk aquifers and do not contain significant areas of clay with flints or plateau drifts. However, four of the five overestimated catchments dominated by Low Flow HOST Group 1 are graded AB, and are at the margin of the AB to AC threshold as a result of significant abstractions. Abstractions would, of course, reduce the observed Q95(1) to below the natural value for the catchment. In the case of the three urban catchments, the spatial extent of the urban area can result in a high estimate of Q95(1) value (29.5% of MF for urban fractions), whereas the urban area has a lesser impact on the low flows than the underlying hydrogeology.

Catchments with the largest positive residuals (underestimating) exhibit less consistency than the largest negative residuals, which suggests that there is no single HOST or Low Flow HOST grouping which is consistently underestimating. Interestingly, catchments dominated by Chalk appear amongst the worst underestimates as well as amongst the worst overestimates. Eight of the ten catchments with high positive residuals are graded A for artificial influences, but three have known net imports of water which would have the effect of increasing the observed Q95(1) above the natural Q95(1).

The extent of lakes within catchments has been represented in the final analysis by LFHG12. To reduce the error in low flow estimation in catchments with lakes alternative analyses were carried out based on the replacement of LFHG12 by FALAKE, as measured from 1:50,000 maps, but no improvement in the estimation procedure was found. Analyses were undertaken to investigate relationships between observed low flow response and average annual rainfall amongst catchments dominated by a single Low Flow HOST Group. No significant relationships were found, as illustrated in Figure 4.10, by catchments dominated by Low Flow HOST Group 7. Analyses were repeated using only those 490 gauging stations graded AA but these offered no significant improvement in the errors of estimation.

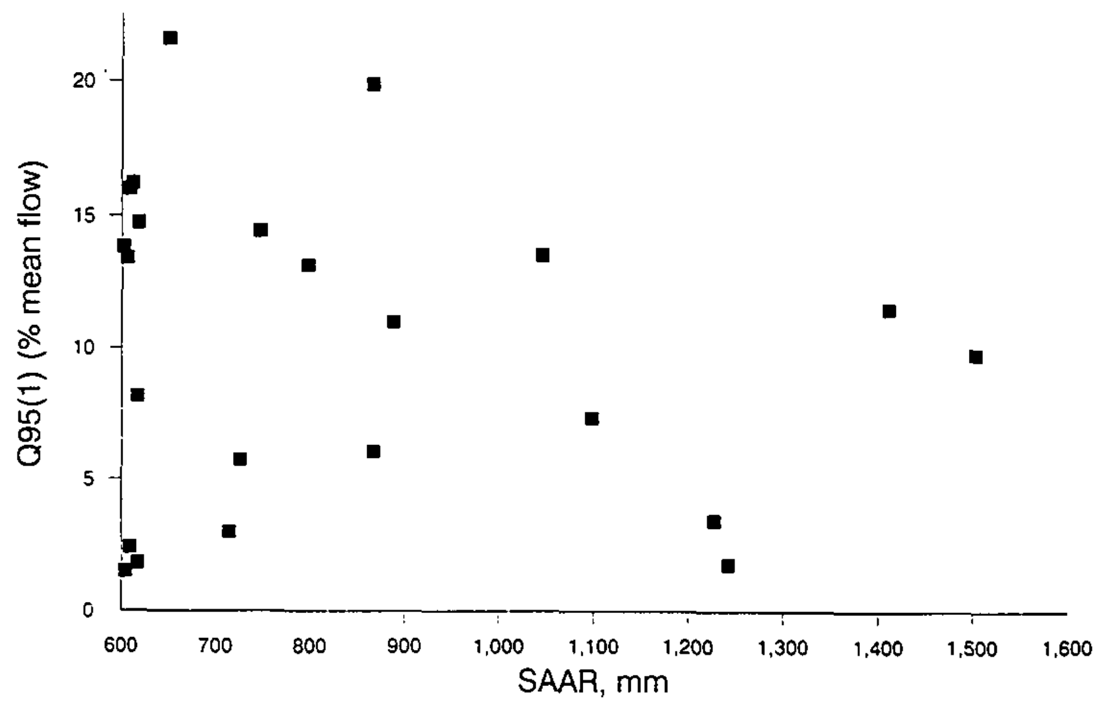


Figure 4.10 *Absence of relationship between Q95(1) and SAAR amongst catchments dominated by LFHG7*

5 Estimation of flow duration and low flow frequency curves at ungauged sites

Chapter 4 described how Q95(1), the 95 percentile from the flow duration curve and MAM(7), the seven day mean annual minimum, could be estimated at ungauged sites. This section describes how the complete flow duration curve and low flow frequency curves for different durations may be derived.

5.1 FLOW DURATION CURVE

The initial approach to developing a procedure for estimating the flow duration curve at an ungauged site was to establish which variables controlled the slope of the line. This was investigated by calculating values of Q95, Q10 and Q99 for each of the 845 time series of daily mean flows having Q95 greater than zero. The following ratios were then derived from each flow duration curve:

$$R(Q10) = Q10/Q95$$

$$R(Q99) = Q99/Q95$$

Values of the two ratios were then related to Q95(1), AREA and SAAR. This analysis showed that Q95(1) was the only significant variable in controlling the slope of the flow duration curve, that is there was no significant difference between the gradients of the curve and catchment area and average annual rainfall. Inspection of a number of curves indicated that they did not plot exactly as straight lines using a log normal transformation. It was therefore not possible to use simple relationships based on gradients alone. The procedure adopted was to maintain the shape of the predicted curves by pooling groups of flow duration curves. This was achieved by deriving the 845 curves and pooling them according to their Q95(1) value into one of 15 groups shown on Table 5.1.

Table 5.1 *Number of flow duration curves in each class interval of Q95(1)*

Q95(1) % MF	Number of flow duration curves
< 2.5	14
2.5 - 7.5	132
7.5 - 12.5	197
12.5 - 17.5	177
17.5 - 22.5	103
22.5 - 27.5	83
27.5 - 32.5	53
32.5 - 37.5	30
37.5 - 42.5	22
42.5 - 47.5	17
47.5 - 52.5	5
52.5 - 57.5	3
57.5 - 62.5	4
62.5 - 67.5	4
67.5 - 72.5	1

A computer program was used to derive the mean curve for each group of stations by finding the mean discharge (expressed as a percentage of the mean flow) for each of 40 class intervals of x, the plotting position on the frequency axis. Examples of 17 individual flow duration curves are shown on Figure 5.1. The standard deviation of the range of individual curves and the pooled curve are shown on Figure 5.2. In addition Figure 5.2 illustrates pooled curves for 2 contrasting groups of stations. The complete set of pooled curves are shown on Figure 5.3.

A family of twenty type curves were then interpolated between the pooled curves such that the logarithm of Q95(1) was equally spaced. Thus type curve 0 had a Q95(1) of 1% MF and type curve 19 had a Q95(1) of 79.43% MF. The shape of the curve is therefore entirely dependent on the value of Q95(1). The derived type curves are shown on Figure 5.4 and Table 5.2. In design studies individual curves can be interpolated between the values shown.

Table 5.2 *Flow duration type curves (percentage of mean flow)*

Q95(1)		1.00	1.26	1.58	2.00	2.51	3.16	3.98	5.01	6.30	7.94
Type curve		0	1	2	3	4	5	6	7	8	9
Percentile	2	975.70	904.17	838.77	776.04	719.91	667.48	618.22	572.53	520.00	472.29
	5	577.26	1534.08	511.37	480.48	452.42	425.82	400.44	376.64	350.65	326.46
	50	20.49	22.69	25.10	27.86	30.82	34.11	37.81	41.82	45.10	48.64
	80	3.70	4.42	5.27	6.33	7.54	9.00	10.77	12.86	15.20	17.98
	90	1.73	2.13	2.62	3.25	3.99	4.92	6.07	7.47	9.16	11.22
	95	1.00	1.26	1.58	2.00	2.51	3.16	3.98	5.01	6.30	7.94
	99	0.38	0.51	0.67	0.88	1.16	1.53	2.02	2.65	3.46	4.52

Q95(1)		10.00	12.57	15.83	19.93	25.13	31.64	39.81	50.13	63.12	79.43
Type curve		10	11	12	13	14	15	16	17	18	19
Percentile	2	428.96	389.60	353.86	321.39	291.65	264.89	240.09	206.89	178.28	153.69
	5	303.93	282.96	263.44	245.26	228.19	212.45	197.49	176.99	158.62	142.20
	50	52.46	56.57	61.01	65.79	71.00	76.57	82.60	89.91	97.86	106.49
	80	21.25	25.13	29.71	35.12	41.58	49.16	58.08	67.82	79.21	92.46
	90	13.75	16.86	20.66	25.32	31.09	38.10	46.67	56.95	69.50	84.77
	95	10.00	12.57	15.83	19.93	25.13	31.64	39.81	50.13	63.12	79.43
	99	5.89	7.69	10.03	13.08	17.11	22.32	29.13	39.00	52.22	69.85

5.2 FLOW FREQUENCY CURVE

5.2.1 Duration relationship

To enable mean annual minima flow frequency curves of other than the 7 day duration to be estimated a study was carried out of the relationship between the mean annual minimum of different durations. Figure 5.5 shows the relationship between minima of different durations for two contrasting catchments. Station 85003 (Falloch at Glen Falloch) is impermeable and has a low value of MAM(7) a high value of MAM(180) and thus a high value of GRADMAM the gradient of the duration relationship. In contrast station 39019 (Lambourn at Shaw) is permeable and has a higher value of MAM(7) and a lower gradient.

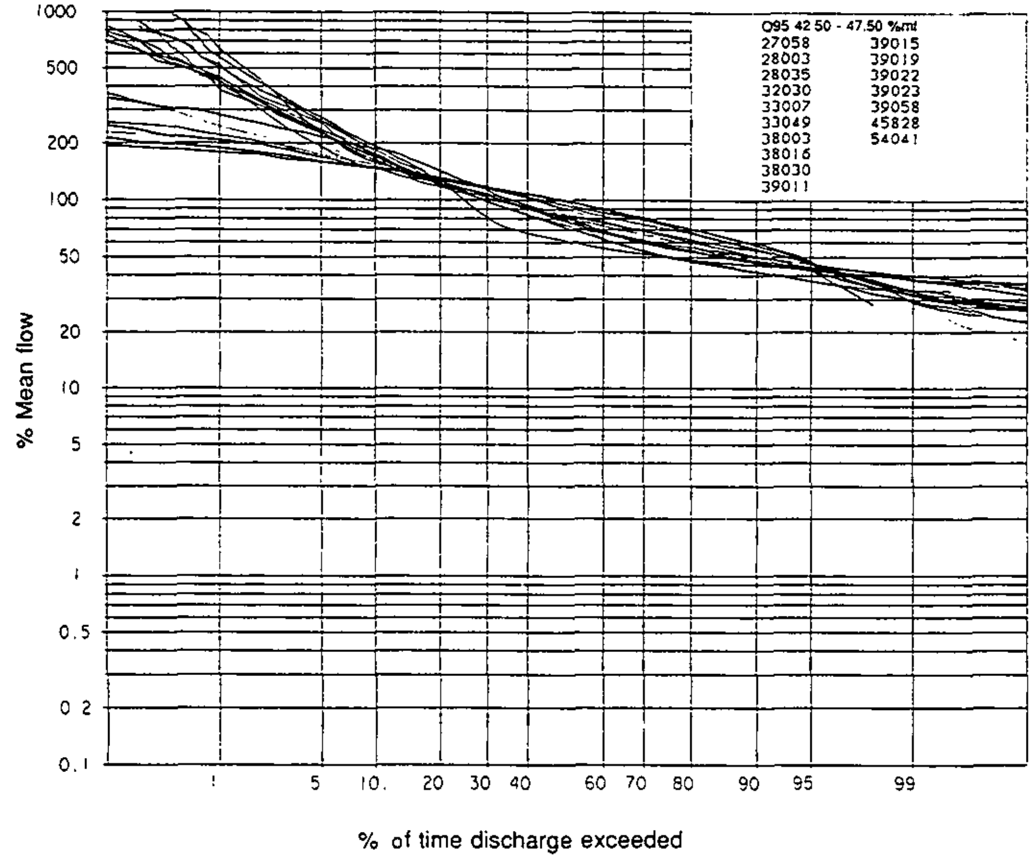


Figure 5.1 *Individual flow duration curves for catchments in Q95(1) range 42.5 - 47.5.*

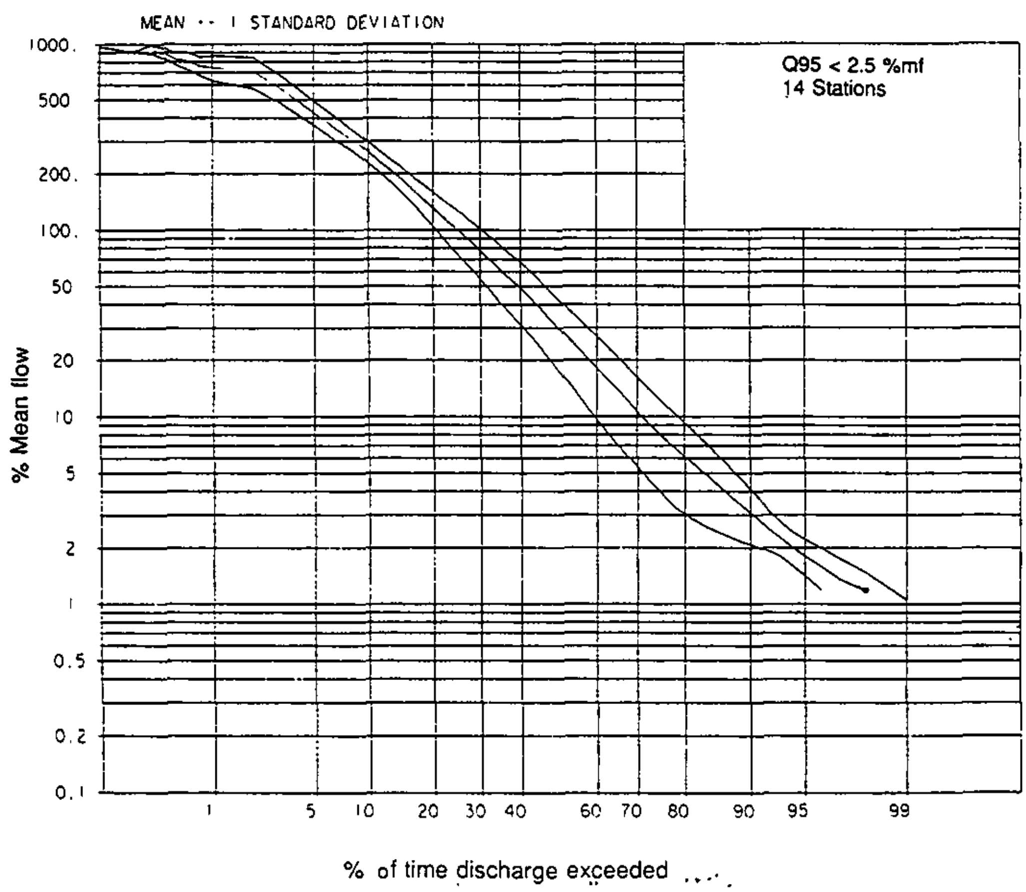
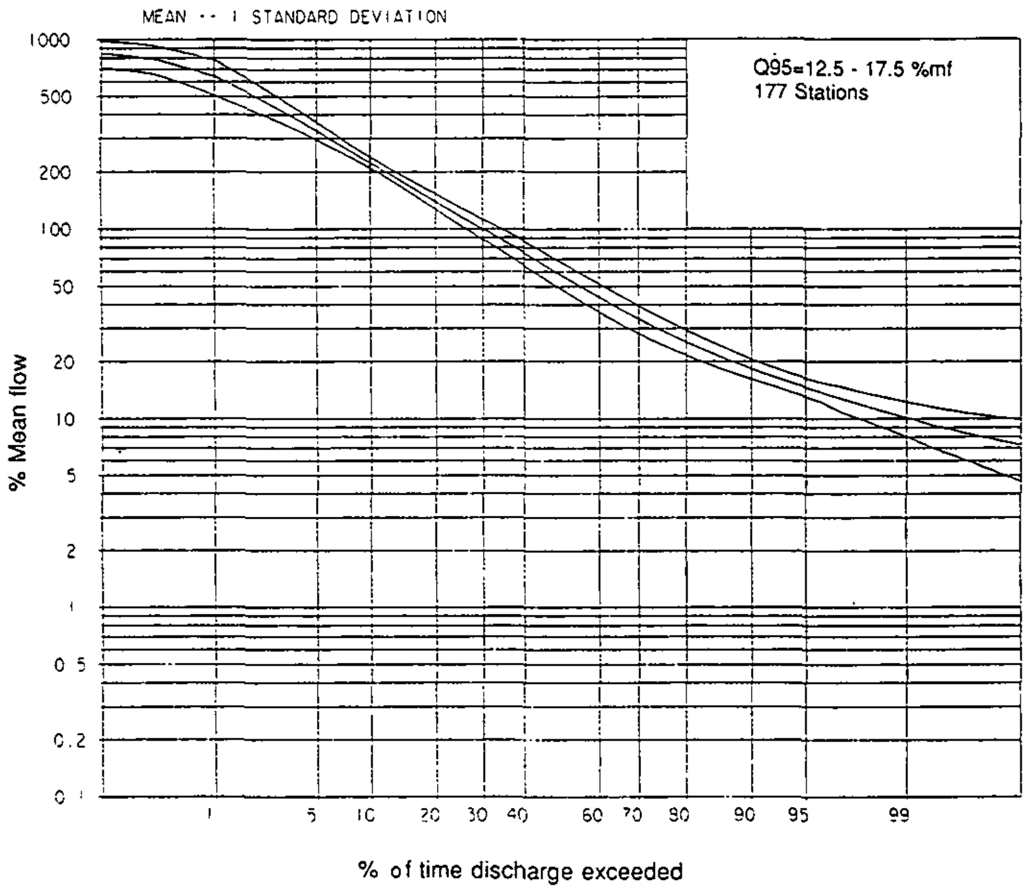


Figure 5.2 *Examples of flow duration curves for groups defined by Q95(1)*



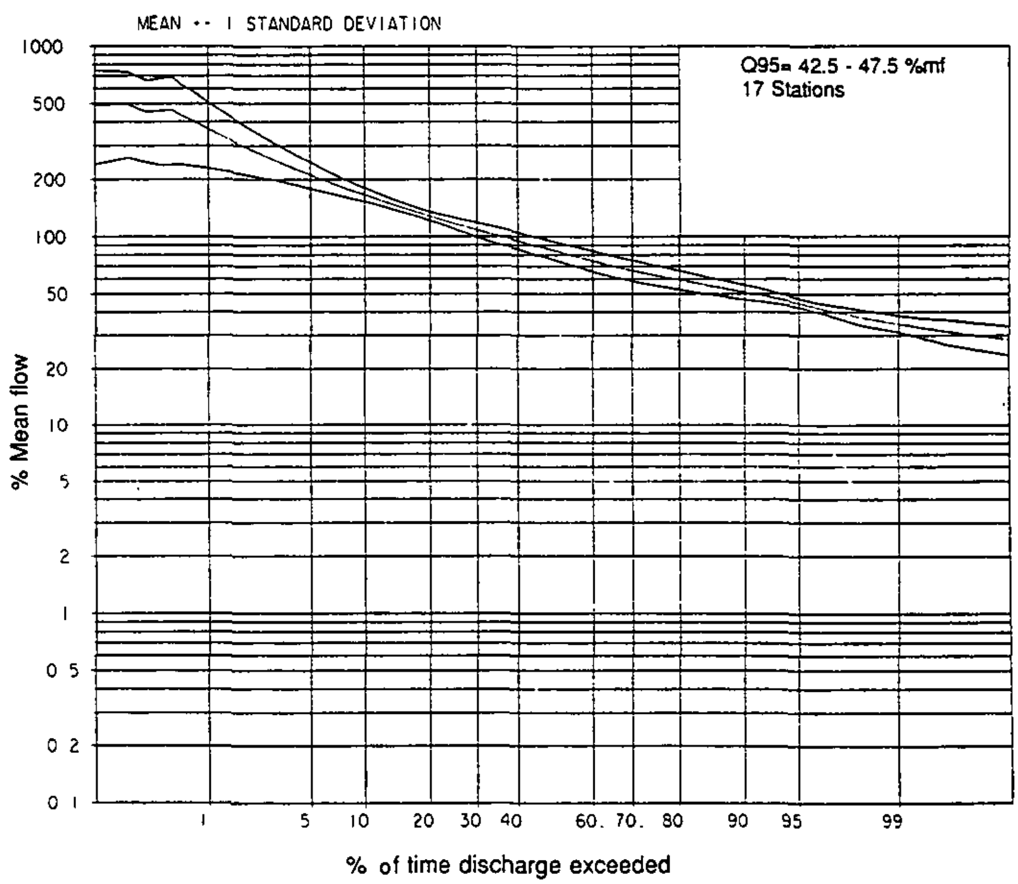


Figure 5.2 *Continued*

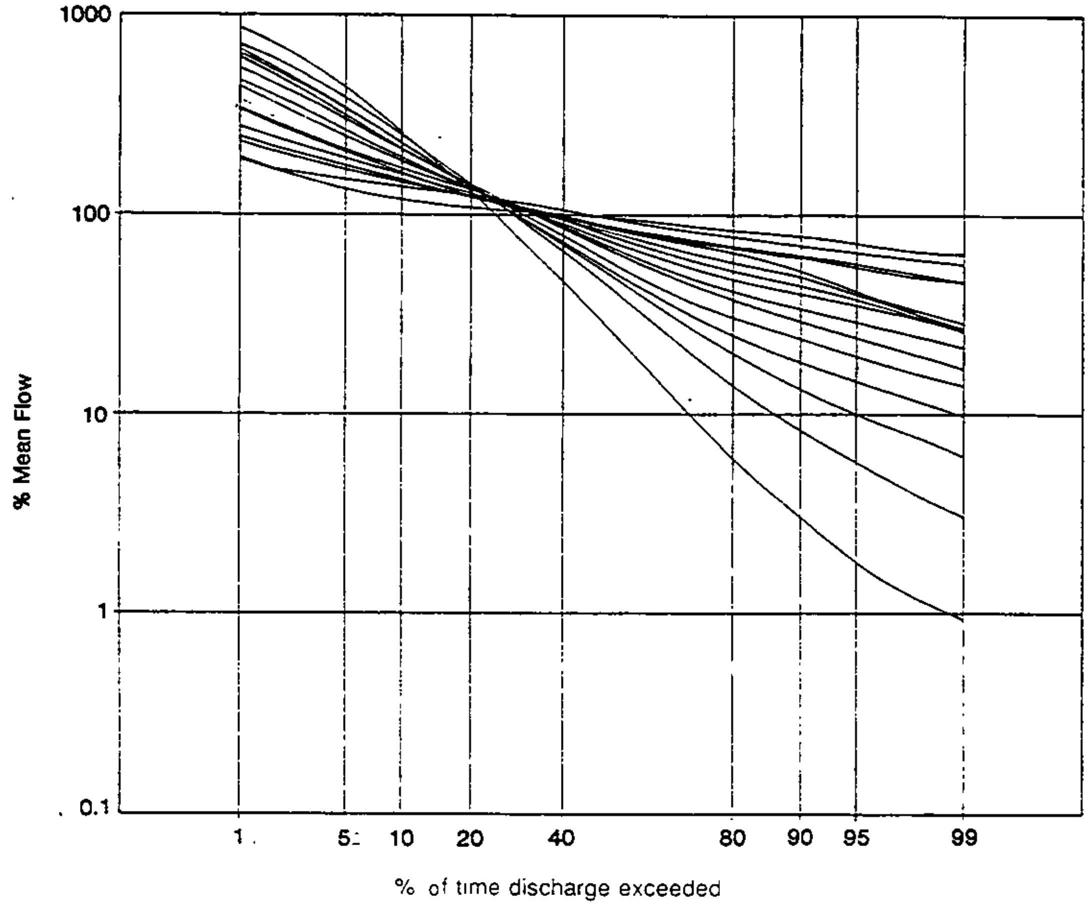


Figure 5.3 *Examples of pooled flow duration curves*

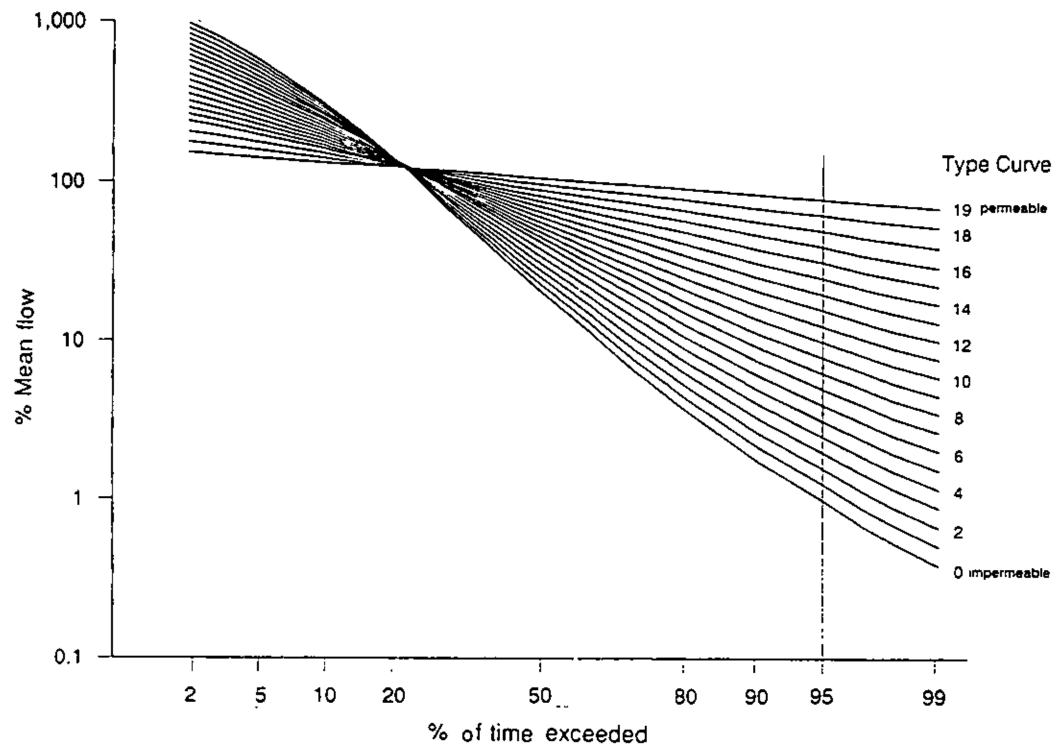


Figure 5.4 *Type curves for flow duration curve*

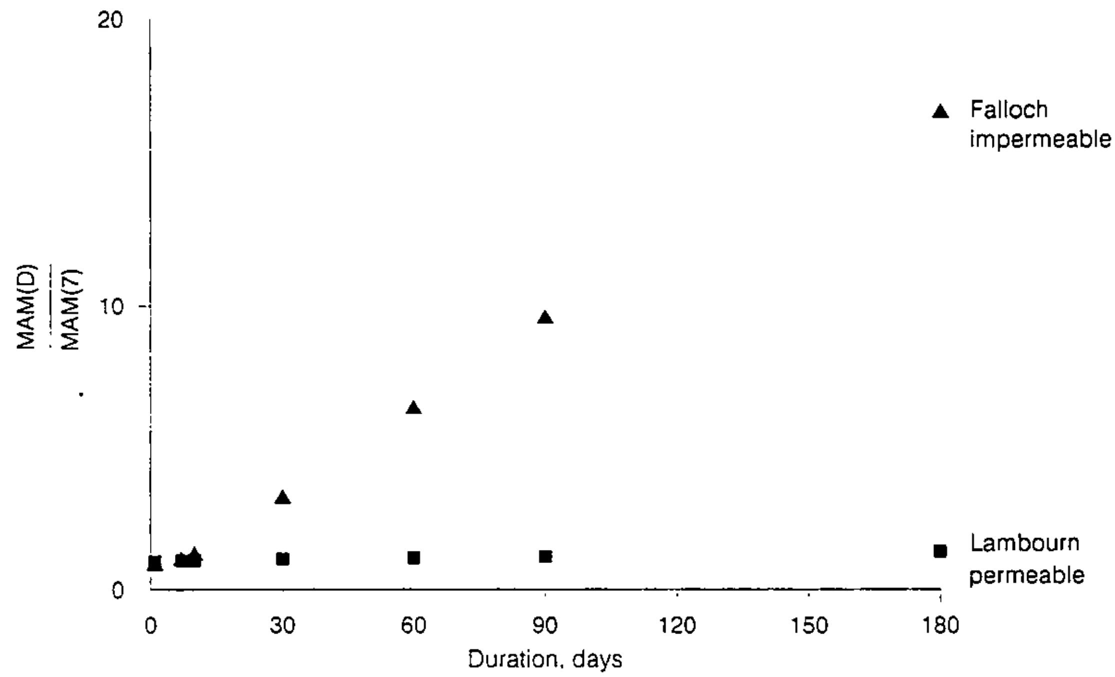


Figure 5.5 *Relationship between annual minima of different durations.*

For each station values of GRADMAM were derived and related to flow and catchment characteristics. MAM(7) and SAAR were found to be the most significant variables enabling the gradient of the duration relationship to be estimated from

$$GRADMAM = 2.12\ .10^{-3}\ MAM(7)^{-1.02}\ SAAR^{0.629} \qquad (5.1)$$

$$R^2 = 0.916 \qquad fse = 1.29$$

From the linear relationship between MAM(D) and D we obtain

$$MAM(D) = MAM(D)\ ((1+(D-7)\ GRADMAM)) \qquad (5.2)$$

This enables the mean annual minimum of any duration up to 180 days (the maximum value used in the analysis) to be estimated.

5.2.2 Frequency relationship

To estimate discharges other than the mean of the annual minima, relationships were derived based on pooled flow frequency curves following a similar procedure to the flow duration curve analysis. Flow frequency curves were derived for annual minima of durations (D) of 1, 7, 30, 60, 90 and 180 days for 680 stations with more than 5 years of data. A missing year criteria was adopted such that if a year contained more than 7 missing days it was rejected. Calculated mean annual minima of D-day duration are presented in Appendix 5. Figure 5.6 illustrates annual mimimum plots for two contrasting flow records and for four durations. It can be seen that the curve for the 7 day minimum is very much lower for station 85003, the impermeable catchment, than for station 39019 which is a chalk catchment. Differences between durations are greater for the more impermeable catchment. This analysis was repeated on all the flow records, producing 3960 individual flow frequency curves.

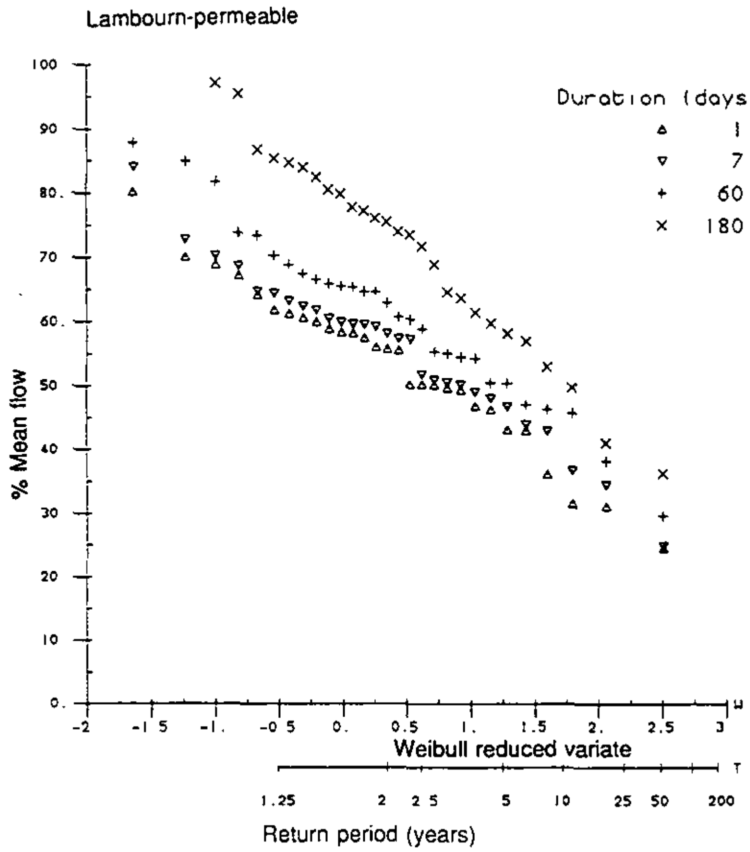
Standardisation of individual minima by MAM(D) reduced the variability between minima of different durations and between different stations. Figure 5.7 shows the same data plotted on Figure 5.6 with the annual minima standardised by MAM(D). All stations were then allocated to one of 15 class intervals of MAM(7), Table 5.3 shows the number of stations in each group. For each group of stations and for each duration a pooled annual minima curve was derived resulting in 90 curves. The pooling procedure was carried out by calculating the mean discharge (standardised by MAM(D)) and mean Weibull reduced variate for class intervals of reduced variate. It was found that the range of pooled curves could be described by the family of twelve type curves shown in Figure 5.8 and Table 5.4. These were then overlain on each of the 90 curves to assign a type curve for a given value of MAM(7) and duration (Table 5.4).

The type curves enable the annual minima (AM) of any probability (P) for any duration (D), AMP(D), to be estimated from the mean annual minimum MAM(D). This is achieved by multiplying the value of MAM(D) by the appropriate type curve factor shown on Table 5.4. It is helpful to mark on a return period scale which can be derived from

$$T = \left[1 - \exp\left[-(1 - W/4)^4\right]\right]^{-1} \tag{5.3}$$

or

$$W = 4\left[1 - \left\{-\ln\left[(T-1)/T\right]\right\}^{1/4}\right] \tag{5.4}$$



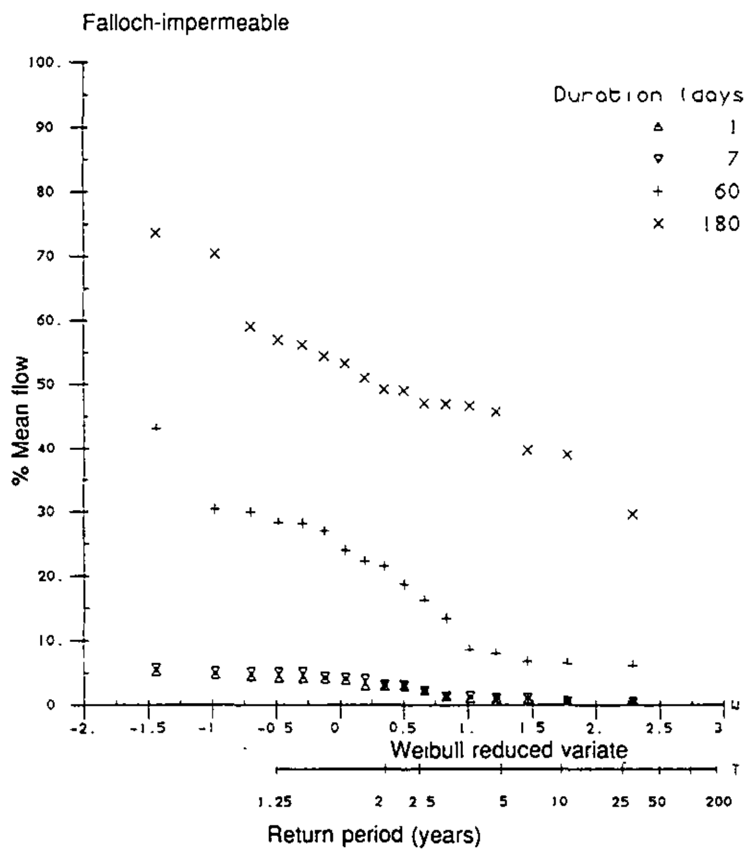
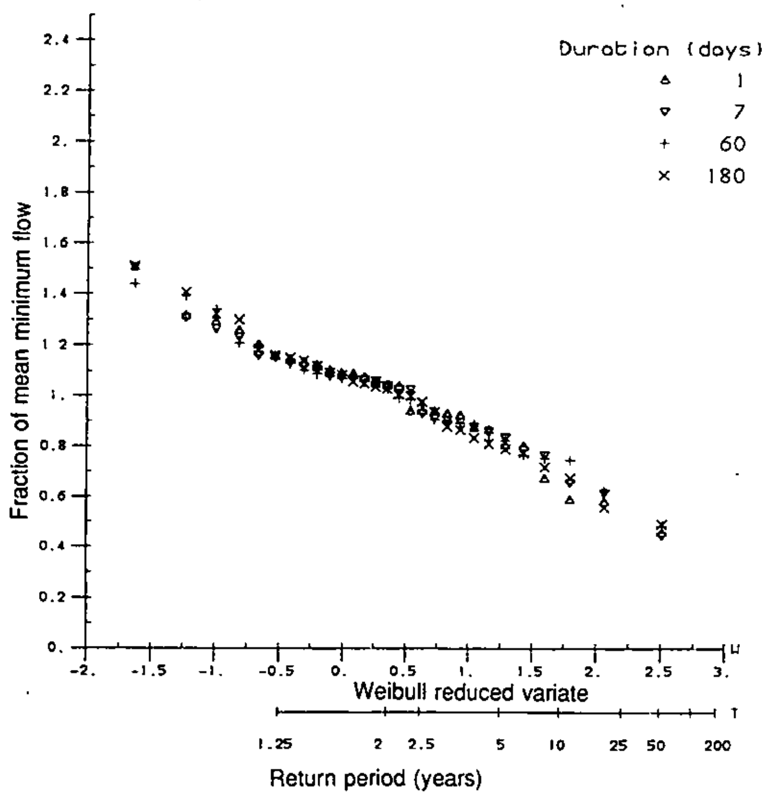


Figure 5.6 *Example low flow frequency curves for two contrasting flow records and for four durations*

Lambourn-permeable



Falloch-impermeable

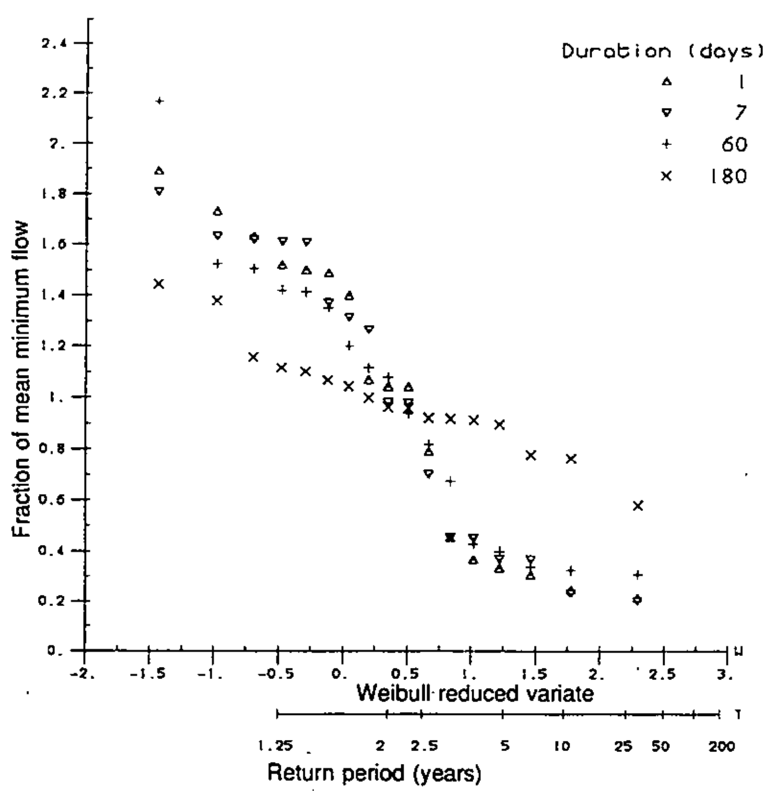


Figure 5.7 *Low flow frequency curves standardised by MAM(D)*

Table 5.3 *Number of low flow frequency curves in each class interval of MAM(7)*

MAM(7) % MF			NUMBER OF LOW FLOW FREQUENCY CURVES
	<	2.5	16
2.5	-	7.5	87
7.5	-	10.0	69
10.0	-	12.5	59
12.5	-	15.0	83
15.0	-	17.5	64
17.5	-	22.5	90
22.5	-	27.5	66
27.5	-	32.5	50
32.5	-	37.5	35
37.5	-	42.5	13
42.5	-	47.5	16
47.5	-	52.5	12
52.5	-	62.5	11
	>	62.5	9

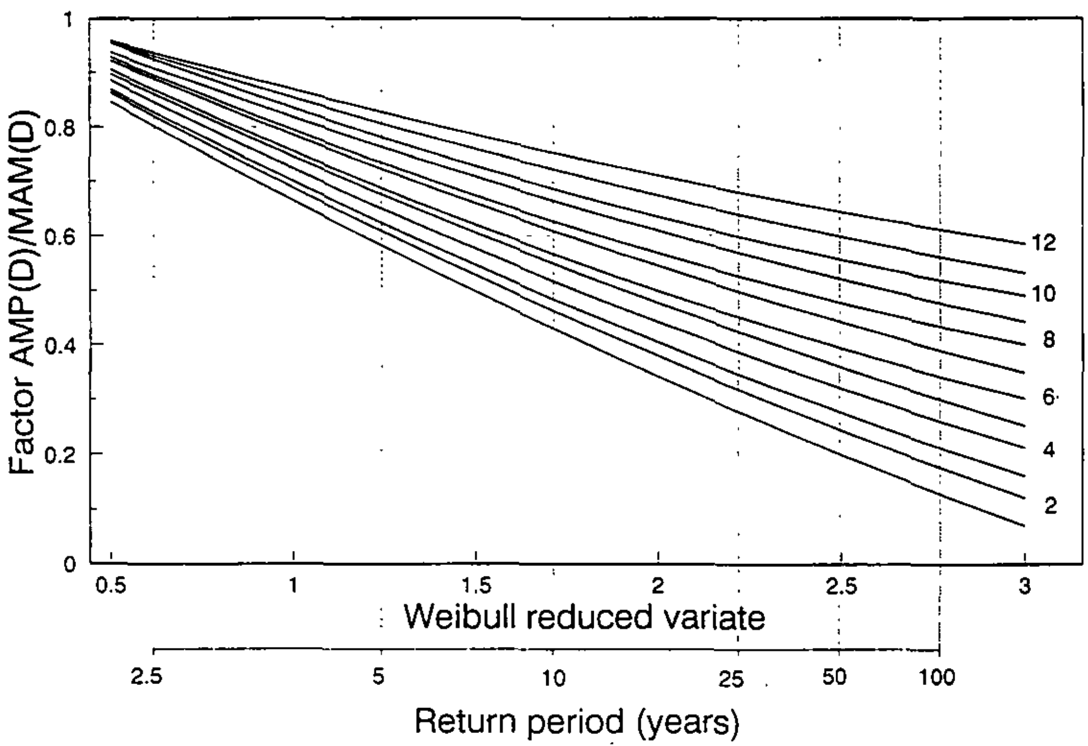


Figure 5.8 *Type curves for low flow frequency curves*

Table 5.4 *Type curves for low flow frequency*

Plotting position	TYPE CURVE											
W	1	2	3	4	5	6	7	8	9	10	11	12
0.5	0.85	0.86	0.87	0.89	0.90	0.91	0.92	0.93	0.94	0.96	0.96	0.96
1.0	0.66	0.69	0.70	0.72	0.75	0.76	0.79	0.80	0.82	0.84	0.86	0.87
1.5	0.50	0.53	0.55	0.58	0.61	0.62	0.66	0.68	0.71	0.73	0.76	0.79
2.0	0.34	0.38	0.40	0.44	0.48	0.50	0.54	0.57	0.61	0.64	0.68	0.71
2.5	0.20	0.24	0.27	0.32	0.36	0.39	0.44	0.48	0.52	0.56	0.60	0.65
3.0	0.07	0.12	0.16	0.21	0.25	0.30	0.35	0.40	0.44	0.49	0.53	0.59

Table 5.5 *Assignment of low flow frequency type curves by MAM(7) and duration*

	Duration days			
MAM(7) as % MF	1	7	60	180
5	2	2	1	1
10	5	5	4	5
15	6	6	5	6
20	7	7	7	7
25	7	7	7	7
30	7	7	7	7
35	7	7	7	8
40	7	7	7	8
45	8	8	8	9
50	7	8	9	10
55	11	11	12	12

6 Use of local data

Although the regionalization of low flows enables flow statistics to be estimated at ungauged sites, in design studies local data may be available to improve on the accuracy of low flow estimation. The most suitable technique to use will depend upon the data availability and the average annual rainfall and evaporation of the catchment. The more detailed techniques are of particular value in low rainfall areas where the proportional error in estimating runoff is highest because of the greater error associated with estimating the difference between rainfall and evaporation.

6.1 USE OF LOCAL DATA IN ESTIMATING MEAN FLOW

6.1.1 Using local runoff data

Rather than estimate losses from rainfall, PE and an adjustment factor, losses may be assessed directly from a neighbouring similar gauged catchment. If the annual average rainfall at the site of interest and nearby gauged sites are similar then estimates of runoff in mm can be used directly. If a difference in rainfall exists then it is preferable to calculate losses in mm from the nearby catchment and subtract this loss value from SAAR of the catchment of interest. In transferring either direct estimates of runoff or losses from nearby gauged sites, it is important to consider the magnitude of artificial influences upon the gauged runoff. Where these are significant then naturalisation of observed runoff should be undertaken before transfer to the ungauged site. Values of mean annual runoff for gauging stations are published annually by the Institute of Hydrology in the Hydrological data UK series, at 5 year intervals in Hydrometric Register UK (and are shown for the stations analysed in this study in Appendix 2). A short runoff record can often be usefully adjusted by using a nearby long runoff record and multiplying by the ratio of long to short period runoff from the key station.

6.1.2 Using daily evaporation and soil moisture deficit data

Although requiring more time and data, improvements upon the estimation of mean flow can be made by calculating daily potential evaporation rates from meterological data. Assumptions about the relationship between actual and potential evaporation as soil moisture deficit becomes a limiting factor can then be used to estimate actual evaporation based on potential evaporation and soil moisture deficit data (Grindley 1970). Estimates of daily actual evaporation are available from the Meteorological Office and because the annual variability of evaporation is low (less than rainfall and discharge) then a record of between 5 and 10 years would be sufficient.

6.2 USE OF LOCAL DATA IN ESTIMATING THE FLOW DURATION CURVE

6.2.1 Using relationships between flow frequency curve and flow duration curve

Using the derived Q95(1) and MAM(7) values (Appendix 2) the following relationship was derived.

$$Q95(1) = 0.239 MAM(7)^{0.990}\ SAAR^{0.199} \quad f.s.e.\ 1.16 \quad R^2 = 0.951 \qquad (6.1)$$

Thus, if a record of the lowest 7 day flows experienced in each year, for say 5 years is available, the MAM(7) obtained from that data enables an estimate of Q95(1) to be made, using the linking relationship.

6.2.2 Use of current meterings

A programme of current meterings carried out at the site of interest provides a good alternative for estimating the flow duration curve. The method is illustrated on Figure 6.1 and can be summarised as follows:

1. Select an appropriate analogue gauged catchment(B) with a well established flow duration curve and a similar low flow response to the site of interest. Comparison of Low Flow HOST groups will assist in this task.

2. At site of interest (A) measure discharge Q with current meter.

3. From concurrent discharge at the analogue station estimate flow percentile (P) from the period of record flow duration curve.

4. Plot Q against P.

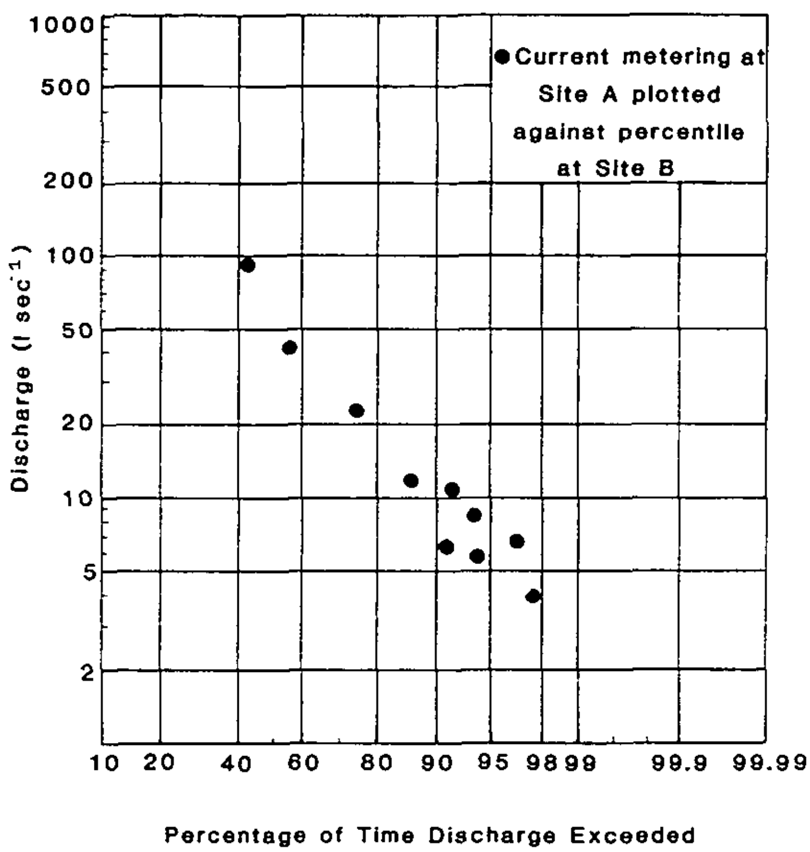


Figure 6.1 *Estimation of the flow duration curve from adjacent current meterings*

To derive the full flow duration curve then current metering should be carried out over a wide range of flows. Alternatively they could be focused on the lower part of the curve if the design problem is restricted to low flows.

6.2.3 Use of a short period of continuous data

If a nearby catchment with more than 2 years of data is available then the short discharge record at the site of interest can be regressed against the discharge at the long term station using the overlap period and then predicted by the regression equation for the non-overlap period. The simulated flows can then be used to derive a flow duration curve.

Alternatively if one or two years of data were available at the site of interest, then the Base Flow Index (Section 3.1.2) could be derived and used to estimate MAM(7) or Q95(1) expressed as a percentage of the mean flow from the following equation.

$$Q95(1) = 44.1\ BFI^{1.43}\ SAAR^{-0.0330}\ AREA^{0.0342} \qquad R^2 = 0.618 \quad f.s.e. = 1.52 \tag{6.2}$$

6.3 USE OF LOCAL DATA IN ESTIMATING THE LOW FLOW FREQUENCY CURVE

6.3.1 Using relationship between the flow duration curve and low flow frequency curve

If the flow duration curve has previously been obtained, perhaps from current meterings, or from a period of record that is perhaps too short to enable the flow frequency curve to be estimated accurately, the following linking relationship between MAM(7) and Q95(1) can be used

$$MAM(7) = 6.40\ Q95(1)^{0.953}\ SAAR^{-0.238} \qquad R^2 = 0.956 \quad f.s.e.\ 1.16 \tag{6.3}$$

6.3.2 Use of current meterings

A method entirely analogous to that described for the flow duration curve is not possible because the likely span of frequencies on the current metering days is likely to be very narrow. The method recommended here is to use the current meterings firstly to obtain an improved estimate of the flow duration curve (Section 6.2.2). Having obtained estimates of Q95(1) the linking relationship between flow duration and low flow frequency may be used (Section 6.3.1).

6.3.3 Use of a short period of continuous data

If a nearby gauging station with more than twenty years of data is available then a regression analysis between a short record and the long term analogue catchment can be established. The flow frequency curve of the analogue station can then be estimated by analysing the simulated daily flow data.

If one or two years of data are available then the Base Flow Index should be calculated from these data. MAM(7) can then be estimated using the linking relationship between MAM(7) and BFI, which is

$$MAM(7) = 190.99\ BFI^{1.52}\ SAAR^{-0.199} \qquad (6.4)$$

$$R^2 = 0.717 \quad f.s.e.\ 1.45$$

7 Summary of low flow estimation procedure

7.1 FLOW DURATION CURVE

7.1.1 Introduction

The procedure for estimating the flow duration curve depends on the availability of data at or near the site of interest. Suggested guidelines for a given length of record are summarized below.

More than two years Records of this length need no adjustment. However regression analysis using an adjacent long period station would improve the estimation procedure.

One or two years Calculate the Base Flow Index (Section 3.1.2) from data and estimate Q95(1) from BFI (Section 6.2.3). Use water balance method to estimate mean flow (Section 7.3.2), or extension of short period of data by regression relationship with adjacent long period station.

No data Derive Q95(1) from Low Flow HOST Group (Section 7.1.2) and estimate flow duration curve using Type Curve procedure (Section 7.1.3).

The procedures for estimating the curve of the ungauged site are divided into two components, as shown in Figure 7.1.

(a) Estimation of the 95 percentile discharge expressed as a % MF. This locates point A on the diagram which has in this example a discharge of 10% MF. This calculation is explained in Section 7.1.2 and is referred to as the External relationship (with catchment characteristics).

(b) Estimate a percentile other than the 95 percentile, Qp (e.g. Qp = 70). This locates point B on the diagram which has a value of 40% MF. This is described in Section 7.1.3 and is referred to as an Internal frequency relationship.

7.1.2 External relationship

The Q95(1) can be derived from the Low Flow HOST Groups weighted by the area of each Group, as follows:

1. Calculate the fraction of each soil association in the catchment.

2. Using Appendix 4, extract the Q95(1) value for each soil association represented.

3. Calculate the mean catchment Q95(1) by weighting each association Q95(1) by the fractional area of that association.

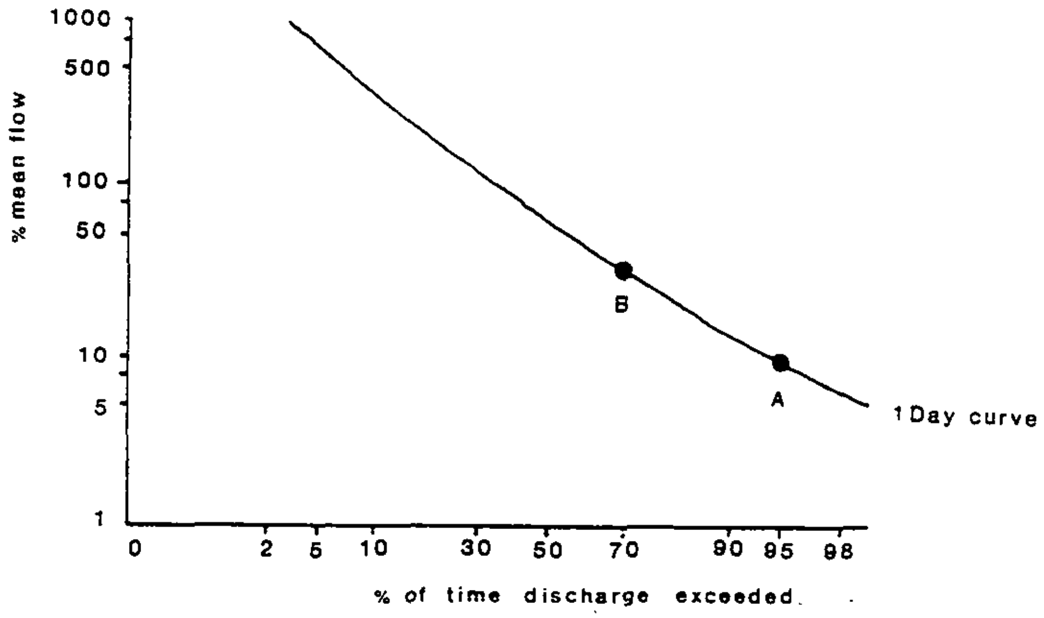


Figure 7.1 *Estimation procedure for ungauged case*

7.1.3 Internal frequency relationship

The process of obtaining flow duration percentiles other than 95 consists of calculating discharges from Figure 7.2 or Table 7.1. The type curve is determined solely by the value of Q95(1) using Table 7.1, interpolating between curves where necessary.

7.1.4 Conversion to absolute units

Each step of the estimation procedure expresses discharge in terms of % MF. The final stage in the estimation procedure requires the estimation of the mean flow (Section 7.3) at the site of interest and conversion of the estimated flow duration curve.

7.1.5 Use of local data

A number of methods for incorporating local data into the estimation of the flow duration curve are described in Section 6.2.

7.2 LOW FLOW FREQUENCY CURVE

7.2.1 Introduction

The procedure for estimating the entire low flow frequency curve for any duration D is divided into the following three components which are illustrated by Figure 7.3.

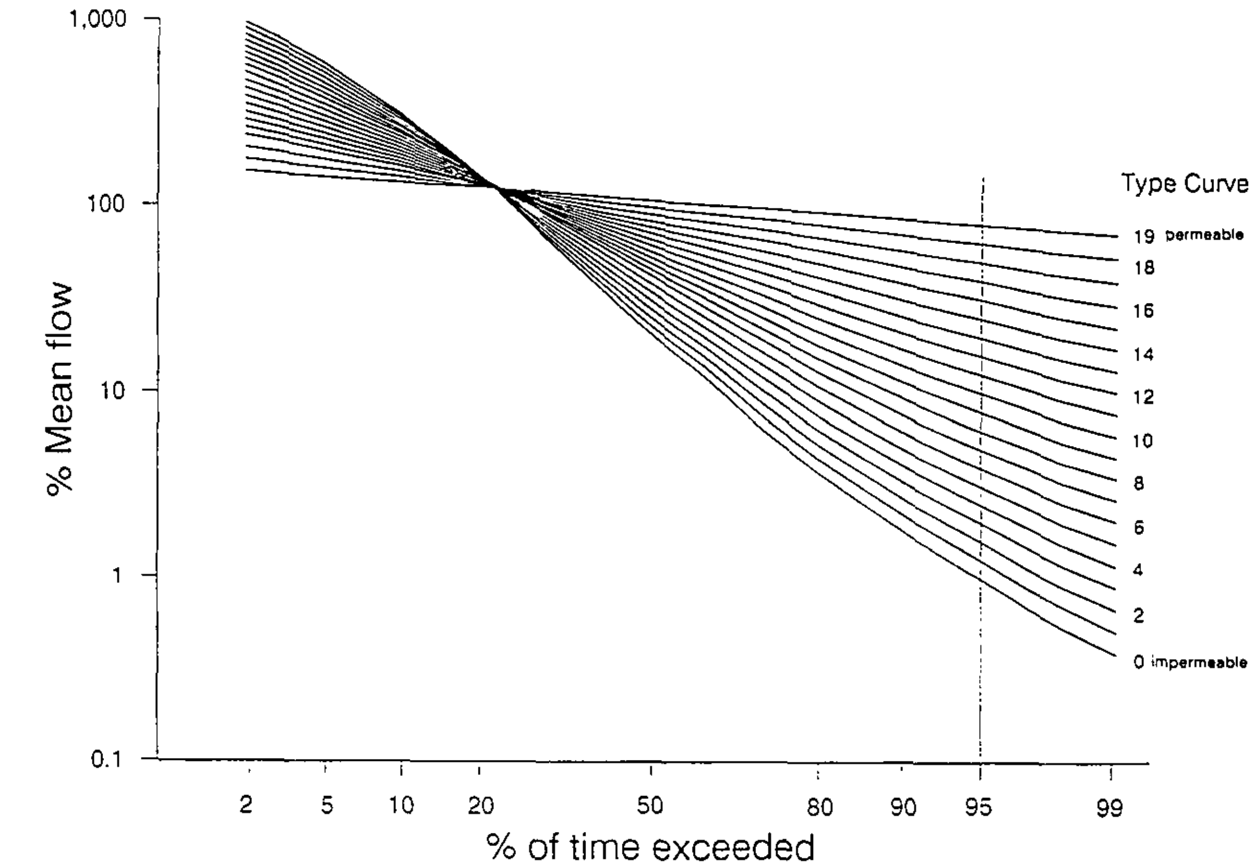


Figure 7.2 *Type curves and frequency relationship for flow duration curve*

Table 7.1 *Flow duration type curves (percentage of mean flow)*

Q95(1)	1.00	1.26	1.58	2.00	2.51	3.16	3.98	5.01	6.30	7.94
Type curve	0	1	2	3	4	5	6	7	8	9
Percentile 2	975.70	904.17	838.77	776.04	719.91	667.48	618.22	572.53	520.00	472.29
5	577.26	1534.08	511.37	480.48	452.42	425.82	400.44	376.64	350.65	326.46
50	20.49	22.69	25.10	27.86	30.82	34.11	37.81	41.82	45.10	48.64
80	3.70	4.42	5.27	6.33	7.54	9.00	10.77	12.86	15.20	17.98
90	1.73	2.13	2.62	3.25	3.99	4.92	6.07	7.47	9.16	11.22
95	1.00	1.26	1.58	2.00	2.51	3.16	3.98	5.01	6.30	7.94
99	0.38	0.51	0.67	0.88	1.16	1.53	2.02	2.65	3.46	4.52

Q95(1)	10.00	12.57	15.83	19.93	25.13	31.64	39.81	50.13	63.12	79.43
Type curve	10	11	12	13	14	15	16	17	18	19
Percentile 2	428.96	389.60	353.86	321.39	291.65	264.89	240.09	206.89	178.28	153.69
5	303.93	282.96	263.44	245.26	228.19	212.45	197.49	176.99	158.62	142.20
50	52.46	56.57	61.01	65.79	71.00	76.57	82.60	89.91	97.86	106.49
80	21.25	25.13	29.71	35.12	41.58	49.16	58.08	67.82	79.21	92.46
90	13.75	16.86	20.66	25.32	31.09	38.10	46.67	56.95	69.50	84.77
95	10.00	12.57	15.83	19.93	25.13	31.64	39.81	50.13	63.12	79.43
99	5.89	7.69	10.03	13.08	17.11	22.32	29.13	39.00	52.22	69.85

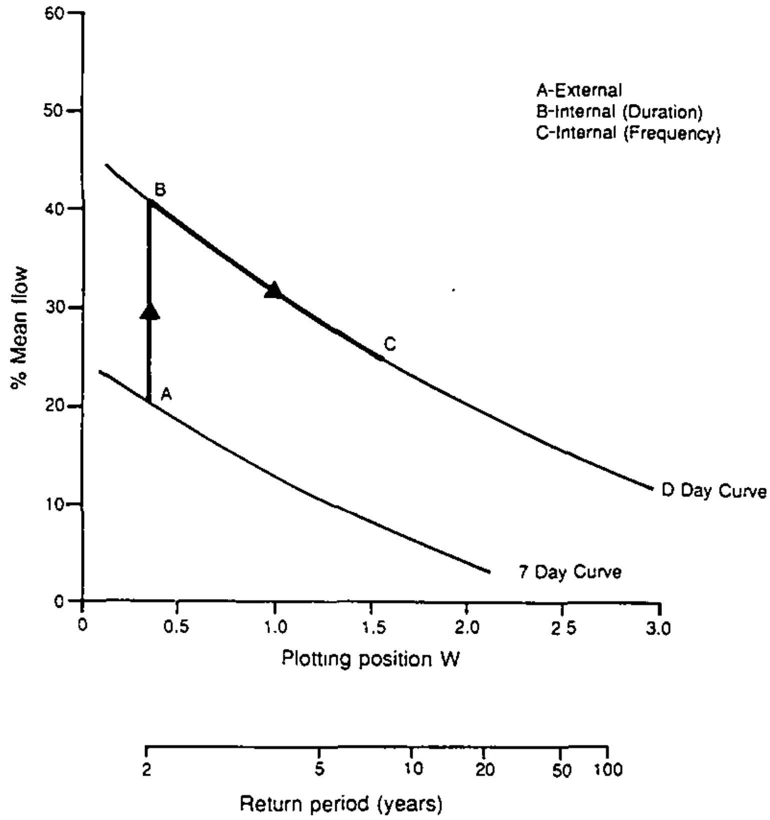


Figure 7.3 *Low flow frequency curve estimation procedure*

(a) Estimation of the 7-day mean annual minimum flow, MAM(7), expressed as a %MF. This locates point A on the diagram (where the mean of the annual minimum series plots at a return period of approximately two years) which has a discharge of 20% MF. This calculation is explained in Section 7.2.2 and is referred to as the External relationship (with catchment characteristics).

(b) Estimation of the mean annual minimum for durations D other than 7-day duration to give MAM(D). This locates point B on the diagram which in Figure 7.3 has a value of MAM(D) of 40% MF. This is described in Section 7.2.3 and is referred to as an Internal duration relationship.

(c) Estimation of the annual minimum of other return periods of probabilities to give AMP(D). This locates point C on the diagram. This is described in Section 7.2.4 and is referred to as an Internal frequency relationship.

If only the mean annual D-day minimum MAM(D) is required, then the step (c) can be omitted. Similarly, if only MAM(7) is required, then both steps (b) and (c) can be omitted. The procedure can frequently be entered at step (b) using a value of MAM(D) from data and using the frequency relationship to estimate AMP(D).

The procedure for estimating the flow frequency curve depends on the availability of data at or near the site of interest. Suggested guidelines for a given length of record are summarized below.

Greater than 20 years	Use the data in cumec units to construct the flow frequency curve directly (Section 3.1.4). If return periods in excess of the length of record are being estimated then the type curves of Section 7.2.4 can be used for extending the curve beyond the range of the data.
Three to twenty years	Calculate the mean annual minimum MAM(D), expressed as a percentage of the mean flow, for the duration of interest. Use the appropriate type curve (Section 7.2.4) to estimate annual minima for a given frequency. For records in excess of 10 years comparisons between the type curves and recorded minima may be used to select the type curve.
One or two years	Calculate the Base Flow Index (Section 3.1.2) from data and estimate MAM(7) from BFI (Section 6.3.3).
No data	Derive MAM(7) from Low Flow HOST Groups (Section 7.2.2). If durations other than 7 days are required then use the internal duration relationship (Section 7.2.3). Estimate low flow frequency curve using Type Curve procedure (Section 7.2.4).

7.2.2 External relationship

The MAM(7) can be derived from the Low Flow HOST Groups weighted by the area of each Group, as follows:

1. Calculate the fraction of each soil association in the catchment.

2. Using Appendix 4, extract the MAM(7) value for each soil association represented.

3. Calculate the mean catchment MAM(7) by weighting each association MAM(7) by the fractional area of that association.

7.2.3 Internal relationship (duration)

Having estimated the value of MAM(7) the next step (if required) is to estimate the mean annual minimum for the duration of interest. This process of obtaining MAM(D) from MAM(7) is in two steps: the first is to obtain the gradient or rate of change of MAM(D)/MAM(7) with D, (GRADMAM); the second is to use this gradient to calculate MAM(D).

The gradient is obtained from the regression:

$$GRADMAM = 2.12 \, . \, 10^{-3} \; MAM(7)^{-1.02} \; SAAR^{0.629} \qquad (7.1)$$

The variable GRADMAM is then substituted into the equation

$$MAM(D) = \{1 + (D-7).GRADMAM\} MAM(7) \qquad (7.2)$$

to give the value of MAM(D) for any required duration, D, in %MF units.

7.2.4 Internal relationship (frequency)

The process of obtaining the low flow of any return period consists of multiplying the mean annual minimum by a factor that is read off a particular type curve. Table 7.2 enables the type curve to be found for the particular duration D and value of MAM(7).

Figure 7.4 shows a family of standardized type flow frequency curves which enable the discharge of any return AMP(D) to be estimated from the mean annual minimum MAM(D). These curves are tabulated on Table 7.3.

Table 7.2 *Curve number for required duration and 7 day mean annual minimum*

MAM(7) as % MF	Duration days			
	1	7	60	180
5	2	2	1	1
10	5	5	4	5
15	6	6	5	6
20	7	7	7	7
25	7	7	7	7
30	7	7	7	7
35	7	7	7	8
40	7	7	7	8
45	8	8	8	9
50	7	8	9	10
55	11	11	12	12

7.2.5 Conversion to absolute units

Each step of the estimation procedure expresses discharge in terms of the % MF. The final stage in the estimation procedure requires the estimation of the mean flow (Section 7.3) at the site of interest and the conversion of the low flow frequency curve.

7.2.6 Use of local data

A number of methods for incorporating local data into the estimation of the low flow frequency curve are described in Section 6.3.

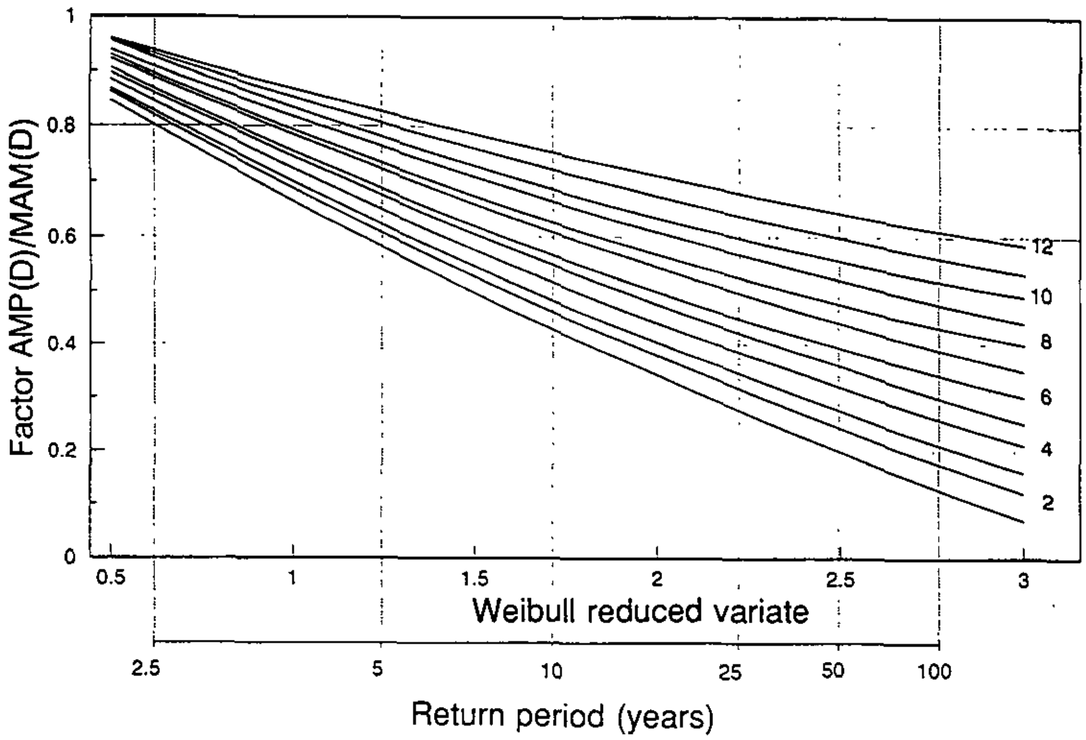


Figure 7.4 *Flow frequency type curves*

Table 7.3 *Flow frequency type curves*

Plotting position	TYPE CURVE											
W	1	2	3	4	5	6	7	8	9	10	11	12
0.5	0.85	0.86	0.87	0.89	0.90	0.91	0.92	0.93	0.94	0.96	0.96	0.96
1.0	0.66	0.69	0.70	0.72	0.75	0.76	0.79	0.80	0.82	0.84	0.86	0.87
1.5	0.50	0.53	0.55	0.58	0.61	0.62	0.66	0.68	0.71	0.73	0.76	0.79
2.0	0.34	0.38	0.40	0.44	0.48	0.50	0.54	0.57	0.61	0.64	0.68	0.71
2.5	0.20	0.24	0.27	0.32	0.36	0.39	0.44	0.48	0.52	0.56	0.60	0.65
3.0	0.07	0.12	0.16	0.21	0.25	0.30	0.35	0.40	0.44	0.49	0.53	0.59

7.3 MEAN FLOW

7.3.1 Introduction

The procedure for estimating the mean flow depends on the availability of data at or near the site of interest. Suggested guidelines for a given length of record are summarized below.

At least two years	Calculate mean flow directly from the gauged flows, provided the flows are sensibly natural.
Less than two years or no data	If the annual rainfall at the site of interest is similar to the adjacent gauged site then transfer an estimate of mean flow from the adjacent gauged site. If they are similar then estimates of runoff in mm can be used directly. If a difference in annual rainfall exists then calculate losses in mm from the adjacent catchment and subtract the losses value from SAAR at the site of interest. Ensure the flows at the adjacent gauged site are sensibly natural, and naturalise if necessary. If there is no adjacent gauged site then estimate mean flow using the catchment water balance methodology (Section 7.3.2). If more than 5 years of daily actual evaporation data from MORECS are available then use this information.

7.3.2 Catchment water balance methodology

Mean flow (in cumecs) can be estimated by the procedure described below.

Calculate average annual runoff depth (AARD) in mm from average annual rainfall (SAAR) and Losses, where

$$AARD = SAAR - LOSSES \tag{7.3}$$

Losses are estimated from

$$LOSSES = r.PE \tag{7.4}$$

$$\text{where } r = 0.00061\ SAAR + 0.475 \quad \text{for } r < 1.0$$
$$r = 1.0 \quad \text{for } SAAR \geq 850 \text{ mm.} \tag{7.5}$$

Convert AARD in mm to Mean Flow in m^3s^{-1} by the conversion

$$MF = AARD\ .\ AREA\ .\ (3.17\ .\ 10^{-5}) \tag{7.6}$$

where AREA = catchment area in km^2.

7.4 ERRORS IN ESTIMATING LOW FLOW STATISTICS AT UNGAUGED SITES

7.4.1 Errors in estimation in this report

The estimation procedure at an ungauged site consists of a number of steps each of which will entail some error. In order to reduce the error of parameter estimation all data have been used in the development of estimation procedures in this report and errors have therefore not been calculated using split record analysis. An approximation of the errors are shown in Table 7.4 assuming that errors from different sources are independent.

Table 7.4 *Errors of low flow statistics*

	f.s.e.
Mean Flow	1.22
Flow Duration Curve	
Q95(1) %	1.55
Q95(1) m^3s^{-1}	1.62
† Q40 m^3s^{-1}	1.65
Flow Frequency Curve	
MAM(7) %	1.60
MAM(7) m^3s^{-1}	1.67
50 year return period 7 day minimum	1.97

† Typical of errors for estimation flows of percentile other than 95

The errors of the two key variables are based on the standard error of the regression analysis which relates Q95(1) and MAM(7) to the Low Flow HOST Groups. This was combined with the factorial standard error in the mean flow (f.s.e. 1.22) to derive a factorial standard error of 1.62 and 1.67 for Q95(1) and MAM(7) expressed in m^3s^{-1}. The flow duration and flow frequency curve pooling program provided estimates of the error of the type curves for the frequency relationship. This was equivalent to an f.s.e. of 1.65 for the 40 percentile of the flow duration curve and 1.97 for the 50 year return period 7 day minimum discharge.

7.4.2 Use of local data

It is not possible to make direct comparisons with the 1980 report because the 1980 method did not provide a technique for direct estimation at ungauged sites. The user was required to develop local estimation methods for BFI derivation. However, an estimate can be made by using results from Low Flow Estimation in Scotland (LFES) (Gustard *et al.*, 1987). This provided a direct method for estimating BFI at an ungauged site using a map showing class intervals of BFI for rivers in Scotland at a scale of 1:625,000. In contrast to the national HOST data base, the map made full use of local data for estimating low flow variables at ungauged sites. Following the publication of this report in 1987 additional calculated values of Q95(1) and MAM(7) are now available for 28 stations in Scotland which were not used for producing the BFI map. This data provides an opportunity to evaluate the errors in using local data (which was used for the BFI map construction) compared with the new national HOST based methodology. Table 7.5 compares observed Q95(1) and MAM(7) with predicted values based on LFES and Low Flow HOST groups for 28 stations not used in deriving the BFI map. The results illustrate the lower errors of the LFES method which incorporates local data. It is anticipated therefore that a locally derived HOST based procedure based on a more detailed analysis of low flow statistics would improve the estimation procedure. It is therefore recommended that, where local gauged data indicate that the Low Flow HOST groups consistently over- or under-estimate low flows, an appropriate percentage adjustment is made to the estimated flow statistic. Figures 4.8 and 4.9 will assist in identifying those regions with the highest residuals.

It is important to note that when comparing errors, the errors of deriving statistics from recorded flow data should be considered. For example, the sampling factorial standard error (excluding hydrometric error and artificial influences) of estimating the mean flow from one year of data ranges from 1.14 to 1.38 with a medium value of 1.23 (based on the CV of 86 UK catchments, Arnell, 1990). This is similar to the factorial standard error of 1.22 in estimating mean flow from SAAR and PE at the ungauged site. Artificial influences and hydrometric errors of gauged low flow statistics will of course increase the apparent error of the estimation procedure.

Table 7.5 *Comparison of estimation techniques with and without the use of local data*

Station	Q95(1) OBS	Q95(1) PLFES	Q95(1) PHOST	MAM(7) OBS	MAM(7) PLFES	MAM(7) PHOST
4005	8.914	11.204	10.987	6.022	9.856	11.011
9005	29.142	19.763	10.502	30.843	20.176	10.706
12008	16.249	17.025	13.414	19.771	17.267	13.378
13004	22.738	14.431	12.252	25.141	14.442	13.227
13008	16.173	18.955	13.850	19.430	19.393	14.929
13009	21.440	19.653	13.198	22.710	20.185	13.539
15021	10.022	12.957	21.027	10.189	13.327	22.342
15025	15.918	13.865	14.421	15.874	13.772	15.246
17015	10.563	17.007	14.891	9.556	17.269	16.109
18010	8.654	15.561	13.718	7.562	14.727	14.373
18014	28.233	12.209	11.046	25.887	1.778	12.220
18018	11.425	4.286	10.966	12.063	3.435	12.097
18019	4.759	4.312	10.829	2.314	3.400	11.262
19017	10.866	13.413	14.729	11.942	14.528	16.472
78006	9.358	6.965	12.252	10.966	6.240	12.483
80004	1.491	4.292	9.531	2.028	3.432	8.704
80005	5.847	4.286	11.802	5.362	3.435	12.866
80006	6.508	2.197	15.161	5.596	1.420	14.002
81006	5.262	6.292	12.857	4.960	5.293	12.111
83008	6.724	5.929	13.303	7.235	5.501	14.058
84029	7.332	6.835	10.710	6.510	6.753	12.365
84030	10.794	17.744	13.274	9.670	17.468	13.989
89008	9.205	4.295	11.252	6.347	3.389	11.819
89009	5.773	4.317	11.958	3.130	3.411	11.698
89805	6.817	3.756	11.799	5.452	2.867	11.588
89807	5.997	2.954	11.931	5.151	2.106	11.249
96002	4.939	3.751	13.400	6.078	2.865	13.618
96003	7.222	5.282	11.260	6.483	4.999	10.184
Mean	11.013	9.769	12.726	10.867	9.026	13.130
Standard error	-	5.018	7.152	-	6.243	7.884

OBS - Calculated from data
PLFES - Predicted from Low Flow Estimation in Scotland method with BFI derived from map
PHOST - Calculated by HOST method in this report

8 Conclusions and recommendations

8.1 CONCLUSIONS

This report has described procedures for the calculation of low flow measures from observed data and for their estimation at ungauged locations throughout the United Kingdom.

The report offers several key improvements over the 1980 Low Flow Studies report:

1. A total of 865 stations have been analysed compared with 538 in 1980;

2. Many gauging stations possess extended data series, which include the recent extreme events of 1976, 1984 and 1989;

3. With the exception of the derivation of Low Flow HOST Groups, data from Northern Ireland have been included.

Over 1600 gauging stations on the National River Flow Archive have been assessed for their suitability for inclusion within the low flow analysis procedures. Each station is graded according to the hydrometric quality of low flow measurement and the degree of artificial influences upon low flows. The grades for each gauging station are published in Appendix 1, along with usable periods of record, which should assist future low flow studies which require the selection of suitable stations.

This report has focused upon the estimation of those flow statistics most commonly used in water resource design by the national water industry. For this reason, the discharge with a 95 percentile exceedance probability is calculated from series of one day flows, and expressed as Q95(1) rather than from ten day flows, Q95(10), as used in the 1980 report. As percentiles of durations other than one day are rarely used by the water industry, this report does not contain techniques for estimating percentiles of other durations. The most common low flow frequency statistic is the mean annual minimum seven day flow (MAM(7)), and techniques have been developed for the estimation of this statistic, and the return period of seven day annual minima. Techniques have been developed for the estimation of the return period of annual minima up to 180 days. For each gauging station used in the analysis, the flow statistics calculated from gauged flow records are published in Appendix 2.

The method for estimating the mean flow adopts the same catchment water balance approach as the 1980 Low Flow Studies report, but the relationship between average annual rainfall (SAAR) and r, the ratio of actual to potential evaporation, has been recalibrated.

This report has benefited from the provisional results of the Hydrology of Soil Type (HOST) project, which has classified over 900 soil associations according to the physical properties of soils and their hydrological response. In this report, the 31 HOST classes have been reduced to 12 Low Flow HOST Groups. For each Low Flow HOST Group the key low flow statistics, Q95(1) and MAM(7), are directly estimated. This improves the ease of application of the low flow estimation procedures, as there is no longer the necessity to develop BFI/geology relationships as was required by the 1980 report. An analysis of estimation errors in Scotland indicates that using local data will improve low flow estimation at the ungauged site.

In addition, this report has benefited from advances in digital cartography for the derivation of catchment characteristics. Digitised catchment boundaries were generated for all 865 gauging stations, which were overlain onto gridded data bases of average annual rainfall, potential evaporation and HOST to enable catchment characteristics to be calculated automatically and consistently. These calculated values of catchment characteristics are published in Appendix 3.

The use of computer-based data bases greatly enhances the opportunity to simplify methods of deriving catchment characteristics at ungauged sites, especially as automated techniques are available for generating synthetic catchment boundaries at ungauged sites (Sekulin *et al.* 1992). Based on these techniques, and the low flow estimation procedures contained within this report, the Institute of Hydrology has developed the MICRO LOW FLOWS software package for the automatic estimation of low flows at ungauged sites. At each stage of the estimation procedure the errors associated with the predicted values are displayed, as well as the method for expressing the total error resulting from the combination of the individual errors from the different stages.

A direct comparison of errors between this report and the 1980 report is not possible because of different data sets, changes in low flow statistics, and the change in methodology from incorporating local relationships between BFI and local geology to the direct estimation of Q95(1) and MAM(7).

In addition to the procedures for estimation of low flows at ungauged sites by relationships with catchment characteristics, methods for incorporating local data are explained. Local data should be incorporated wherever possible to improve the accuracy of low flow estimation.

A feasibility study has been undertaken to investigate the calculation of standard period low flow statistics. This has the objective of overcoming changes in flow statistics at a gauging station over time, and inconsistencies in comparing statistics between different flow records. A procedure based on simple ratios of short to standard period records has been investigated in the Welsh region, but suffers from a shortage of gauging stations with complete flow records during the standard period. The increasing availability of key stations with long flow records in the UK will enable an operational procedure for calculating standard period statistics to be developed.

8.2 RECOMMENDATIONS

It is recommended that:

1) low flow estimation procedures are revised upon completion of the HOST project. This will enable the following components of HOST to be used in low flow estimation: first, percentages of HOST classes in grid squares, rather than the dominant HOST class as used in this study, with benefits for improved estimation in small catchments; second, the boundaries of soil associations within urban areas; third, the HOST classification for Northern Ireland; fourth, the HOST data base at a resolution of 100 m^2 rather than the 1 km^2 resolution used in this study;

2) estimation of mean flow would be improved by a revision of the Meteorological Office 1:2,000,000 scale map of Potential Evaporation. This would take into account advances in understanding the spatial variation of evaporation and a longer time series

of climatic data. A gridded data base for different land-use types would enable the data to be used in PC applications packages;

3) improvements be made in the estimation of the mean flow at ungauged sites to reduce the errors in estimating catchment losses using the water balance procedure. This should include calculating standard period average annual runoff from daily rainfall, evaporation and soil moisture deficit data. The use of groundwater boundaries would assist in this task and a national digital water table data base should be developed;

4) there should be improvements in estimating the low flow response of urban areas and downstream of lakes;

5) further use is made of the HOST data base to enable local, rather than national, relationships to be developed between HOST and low flow statistics;

6) techniques for automatically incorporating local gauged data into estimation at the ungauged site should be developed;

7) a programme for revising low flow estimation procedures on a periodic basis is established, perhaps with revision every ten years;

8) an investigation of the most appropriate distribution and fitting procedures to use for low flow analysis is carried out, including the estimation of the return period of long duration (over-year) low flow events;

9) recent advances in regionalising flood distributions and the definition of regions are applied to low flow statistics;

10) quality assssment of average and flood flows is undertaken to complement the assessment of low flow data quality, applying standard procedures on all United Kingdom gauging stations;

11) naturalisation of all, or part, of the flow record at the 268 gauging stations with good hydrometry but significant artificial flow components (graded AC), giving priority to those in regions of the country which are poorly represented by usable low flow data;

12) further research is required for developing an operational procedure for estimating standard period low flow statistics, based on ratios, regression or rainfall-runoff modelling. These statistics should be updated at five or ten year intervals to improve estimates for low flow design;

13) use be made of MICRO LOW FLOWS and the Water Information System (WIS) software to introduce standardisation and consistency into the application of the estimation procedures.

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Appendix 1 Register of low flow quality classification

STN NO	Station number, as used by the National River Flow Archive.
G1, G2, G3	Initial and subsequent low flow classification grades assigned for hydrometric quality and degree of artificial influence.
SYR1, SYR2, SYR3	Start of period when initial and subsequent grades become effective.
CODE	Codes denote reasons for non-classification of gauging stations. C - composite gauging station P - partial gauging station S - spring flow gauging station Z - no data for gauging station on the National River Flow Archive
UP1SYR UP2SYR	Year of start of usable period of record (grades AA, AB, BA and BB)
UP1FYR UP2FYR	Year of end of usable period of record (grades AA, AB, BA and BB)
PP1SYR PP2SYR	Year of start of pristine period of record (grade AA)
PP1FYR PP2FYR	Year of end of pristine period of record (grade AA)
OMIT1 OMIT2	Years to omit from analysis due to short term anomalies

STN NO	RIVER	STATION	G1	SYR1	G2	SYR2	G3	SYR3	CODE
2001	Helmsdale	Kilphedir	AB	1975					
3001	Shin	Lairg	AA	1953					
3002	Carron	Sgodachail	BB	1974					
3003	Oykel	Easter Turnaig	AA	1977					
3004	Cassley	Rosehall	AB	1979					
3005	Shin	Inveran	AC	1981					
3803	Tirry	Rhian Bridge	AA	1949					
3804	Cassley	Intake							Z
4001	Conon	Moy Bridge	AC	1947					
4002	Glass	Redburn	BC	1974					
4003	Alness	Alness	AA	1974	AC	1979			
4004	Blackwater	Contin	AC	1981					
4005	Meig	Glenmeannie	AA	1986					
5001	Beauly	Erchless	AC	1953					
5002	Farrar	Struy	AC	1986					
5802	Farrar	Loch Beannachran	AA	1952	AC	1963			
6001	Ness	Ness Castle Farm	BB	1935	BC	1956			
6003	Moriston	Invermoriston	AA	1929	AC	1957			
6004	Garry	Invergarry	BA						Z
6006	Allt Bhlaraidh	Invermoriston	AA	1953	AC	1963			
6007	Ness	Ness Side	AC	1973					
6008	Enrick	Mill of Tore	AA	1979					
6808	Allt Graidhe	Fort Augustus	BA						Z
6809	Alt Bhuruisgidh	Ceannacroc	BA						Z
7001	Findhorn	Shenachie	AA	1960					
7002	Findhorn	Forres	AA	1958					
7003	Lossie	Sheriffmills	AB	1963					
7004	Nairn	Firhall	AA	1979					
7005	Divie	Dunphail	AA	1977					
7006	Lossie	Torwinny	AA	1987					
7804	Mosset Burn	Burdshaugh							Z
8001	Spey	Aberlour	AA	1938					
8002	Spey	Kinrara	AB	1951					
8003	Spey	Ruthven Bridge	AC	1951					
8004	Avon	Delnashaugh	BA	1952	AA	1986			
8005	Spey	Boat of Garten	AB	1951					
8006	Spey	Boat o' Brig	AA	1952					
8007	Spey	Invertruim	AC	1952					
8008	Tromie	Tromie Bridge	AC	1952					
8009	Dulnain	Balnaan Bridge	AA	1952					

STN NO	UP1SYR	UP1FYR	UP2SYR	UP2FYR	PP1SYR	PP1FYR	PP2SYR	PP2FYR	OMIT1	OMIT2
2001	1975	1989								
3001	1953	1957			1953	1957			1957	
3002	1974	1989								
3003	1977	1989			1977	1989				
3004	1979	1989								
3005										
3803	1949	1956			1949	1956				
3804										
4001										
4002										
4003	1974	1978			1974	1978				
4004										
4005	1986	1989			1986	1989				
5001										
5002										
5802	1952	1957			1952	1957				
6001	1935	1955								
6003	1929	1945			1929	1945				
6004										
6006	1953	1962			1953	1962				
6007										
6008	1979	1989			1979	1989				
6808										
6809										
7001	1960	1989			1960	1989				
7002	1958	1989			1958	1989				
7003	1963	1989								
7004	1979	1989			1979	1989				
7005	1977	1989			1977	1989				
7006	1987	1989			1987	1989				
7804										
8001	1938	1974			1938	1974				
8002	1951	1989								
8003										
8004	1952	1989			1986	1989				
8005	1951	1989								
8006	1952	1989			1952	1989				
8007										
8008										
8009	1952	1989			1952	1989				

STN NO	RIVER	STATION	G1	SYR1	G2	SYR2	G3	SYR3	CODE
8010	Spey	Grantown	AB	1953					
8011	Livet	Minmore	AA	1978					
8807	Spey	Laggan Bridge	BC	1938					
9001	Deveron	Avochie	AA	1959					
9002	Deveron	Muiresk	AA	1960					
9003	Isla	Grange	CA	1969	AA	1970			
9004	Bogie	Redcraig	AA	1980					
9005	Allt Deveron	Cabrach	BA	1948					
10001	Ythan	Ardlethan	BA	1965					
10002	Ugie	Inverugie	BA	1971					
10003	Ythan	Ellon	AA	1983					
11001	Don	Parkhill	BA	1969					
11002	Don	Haughton	AA	1969					
11003	Don	Bridge of Alford	AA	1973					
11004	Urie	Pitcaple	AA						Z
11801	Urie	Urieside	CA						Z
12001	Dee	Woodend	BA	1929	AA	1973			
12002	Dee	Park	AA	1972					
12003	Dee	Polhollick	AA	1975					
12004	Girnock Burn	Littlemill	BA	1969					
12005	Muick	Invermuick	AA	1976					
12006	Gairn	Invergairn	AA	1978					
12007	Dee	Mar Lodge	AA	1982					
12008	Feugh	Heugh Head	AA	1985					
12801	Glen Dye	Bridge of Dye	AA						Z
13001	Bervie	Inverbirvie	AA	1979					
13002	Luther Water	Luther Bridge	AA	1982					
13003	South Esk	Stannochy Bridge	AA	1979					
13004	Prosen Water	Prosen Bridge	AA	1985					
13005	Lunan Water	Kirkton Mill	AA	1981					
13007	North Esk	Logie Mill	AA	1976					
13008	South Esk	Brechin	AA	1983					
13009	West Water	Dalhousie Bridge	AA	1986					
13801	Brothock Water	Arbroath							Z
13802	North Esk	North Water Bridge							Z
14001	Eden	Kemback	AA	1967					
14002	Dighty Water	Balmossie Mill	AA	1969					
14005	Motray Water	St Michaels	AC	1984					
14006	Monikie Burn	Panbride	AC						Z
14007	Craigmill Burn	Craigmill	AC						Z

STN NO	UP1SYR	UP1FYR	UP2SYR	UP2FYR	PP1SYR	PP1FYR	PP2SYR	PP2FYR	OMIT1	OMIT2
8010	1953	1989								
8011	1978	1989			1978	1989				
8807										
9001	1959	1988			1959	1988				
9002	1960	1989			1960	1989				
9003	1970	1989			1970	1989				
9004	1980	1989			1980	1989				
9005	1948	1988								
10001	1965	1983								
10002	1971	1989								
10003	1983	1989			1983	1989				
11001	1969	1989								
11002	1969	1989			1969	1989				
11003	1973	1989			1973	1989				
11004										
11801										
12001	1929	1989			1973	1989				
12002	1972	1989			1972	1989				
12003	1975	1989			1975	1989				
12004	1969	1988							1981	1982
12005	1976	1989			1976	1989				
12006	1978	1989			1978	1989				
12007	1982	1989			1982	1989				
12008	1985	1989			1985	1989				
12801										
13001	1979	1989			1979	1989				
13002	1982	1989			1982	1989				
13003	1979	1982			1979	1982				
13004	1985	1989			1985	1989				
13005	1981	1989			1981	1989				
13007	1976	1989			1976	1989				
13008	1983	1989			1983	1989				
13009	1986	1989			1986	1989				
13801										
13802										
14001	1967	1989			1967	1989				
14002	1969	1989			1969	1989				
14005										
14006										
14007										

STN NO	RIVER	STATION	G1	SYR1	G2	SYR2	G3	SYR3	CODE
14801	Eden	Gateside							Z
14802	Eden	Pitlessie							Z
15001	Isla	Forter	AA	1953					
15002	Newton Burn	Newton	AA	1959					
15003	Tay	Caputh	AC	1947					
15004	Inzion	Loch of Lintrathen	AA	1927					
15005	Melgan	Loch of Lintrathen	AA	1927	AC	1969			
15006	Tay	Ballathie	AC	1952					
15007	Tay	Pitnacree	AC	1957					
15008	Dean Water	Cookston	BA	1958					
15010	Isla	Wester Cardean	AB	1972					
15011	Lyon	Comrie Bridge	AC	1958					
15012	Tummel	Port-Na-Craig	CC	1973	AC	1979			
15013	Almond	Almondbank	AB	1955					
15014	Ardle	Kindrogan	AA						Z
15015	Almond	Newton Bridge	AC	1986					
15016	Tay	Kenmore	AC	1974					
15017	Braan	Ballinloan	CA	1975					
15018	Lyon	Moar	BC	1953					
15021	Lunan Burn	Mill Bank	AA	1986					
15023	Braan	Hermitage	AA	1983					
15024	Dochart	Killin	AA	1982					
15025	Ericht	Craighall	AA	1985					
15027	Garry Burn	Loakmill	AC	1988					
15028	Ordie Burn	Luncarty	AC						Z
15801	Loch of Lintrathen	Waste Water							Z
15802	Isla	Kemp Hill							Z
15804	Tummel	Ballinluig							Z
15805	Errochty	Struan							Z
15808	Almond	Almond Intake							Z
15809	Muckle Burn	Eastmill	AC	1949					
15810	Garry	Killiecrankie							Z
15811	Almond	Millhaugh							Z
15812	Almond	Auchnafree							Z
15813	Lunan Burn	Lowes Outlet							Z
16001	Earn	Kinkell Bridge	AA	1948	AC	1958			
16002	Earn	Aberuchill	AC	1955					
16003	Ruchill Water	Cultybraggan	AA	1970					
16004	Earn	Forteviot	AC	1958					
16801	Earn	Comrie Bridge							Z

STN NO	UP1SYR	UP1FYR	UP2SYR	UP2FYR	PP1SYR	PP1FYR	PP2SYR	PP2FYR	OMIT1	OMIT2
14801										
14802										
15001	1953	1968			1953	1968				
15002	1959	1968			1959	1968				
15003										
15004	1927	1968			1927	1968				
15005	1927	1968			1927	1968				
15006										
15007										
15008	1958	1989								
15010	1972	1989								
15011										
15012										
15013	1955	1989								
15014										
15015										
15016										
15017										
15018										
15021	1986	1989			1986	1989				
15023	1983	1989			1983	1989				
15024	1982	1989			1982	1989				
15025	1985	1989			1985	1989				
15027										
15028										
15801										
15802										
15804										
15805										
15808										
15809										
15810										
15811										
15812										
15813										
16001	1948	1957			1948	1957				
16002										
16003	1970	1989			1970	1989				
16004										
16801										

STN NO	RIVER	STATION	G1	SYR1	G2	SYR2	G3	SYR3	CODE
16803	Earn	Loch Earn Weir							Z
17001	Carron	Headswood	AC	1969					
17002	Leven	Leven	AC	1969					
17003	Bonny Water	Bonnybridge	BC	1971					
17004	Ore	Balfour Mains	AB	1972					
17005	Avon	Polmonthill	AA	1971					
17006	Carron	Langhill Weir	AC						Z
17007	Red Burn	Glen Cottage							Z
17008	South Queich	Kinross	AA	1988					
17009	Lochty Burn	Thornton	BC						Z
17011	St Monace Burn	Newark	AA						Z
17012	Red Burn	Castle Cary	AC	1986					
17013	Back Burn	Balbirnie	AC						Z
17014	Leven	Loch Leven Sluice							Z
17015	North Quiech	Lathro	AA	1987					
17016	Lochty Burn	Whinnyhall	AC	1986					
17017	Greens Burn	Killyford Bridge	AA	1986					
17806	Leven	Loch Leven Sluice							Z
18001	Allan Water	Kinbuck	AA	1957					
18002	Devon	Glenochil	BA	1959	BC	1979			
18003	Teith	Bridge of Teith	AC	1957					
18004	Devon	Devonvale							Z
18005	Allan Water	Bridge of Allan	AA	1971					
18006	Goodie Water	Netherton							Z
18007	Devon	Fossoway Bridge	AC	1979					
18008	Leny	Anie	AA	1973					
18010	Forth	Gargunnock	BA	1986					
18011	Forth	Craigforth	AC	1981					
18012	Ardoch Burn	Doune Castle	AA	1986					
18013	Black Devon	Fauld Mill	BC	1986					
18014	Bannock Burn	Bannockburn	AA	1986					
18015	Eas Gobhain	Loch Venachar	AC	1986					
18016	Keity Water	Clashmore	AA	1986					
18017	Monachyle Burn	Balquhidder	AA	1983					
18018	Kirkton Burn	Balquhidder	AA	1983					
18019	Comer Burn	Comer	AA	1987					
19001	Almond	Craigiehall	AC	1957					
19002	Almond	Almond Weir	AA	1962					
19003	Breich Water	Breich Weir	AC	1961	AA	1973			
19004	North Esk	Dalmore Weir	AA	1960					

STN NO	UP1SYR	UP1FYR	UP2SYR	UP2FYR	PP1SYR	PP1FYR	PP2SYR	PP2FYR	OMIT1	OMIT2
16803										
17001										
17002										
17003										
17004	1972	1989								
17005	1971	1989			1971	1989			1979	1981
17006										
17007										
17008	1988	1989			1988	1989				
17009										
17011										
17012										
17013										
17014										
17015	1987	1989			1987	1989				
17016										
17017	1986	1987			1986	1987				
17806										
18001	1957	1989			1957	1989				
18002	1959	1978								
18003										
18004										
18005	1971	1989			1971	1989				
18006										
18007										
18008	1973	1989			1973	1989				
18010	1986	1989								
18011										
18012	1986	1987			1986	1989				
18013										
18014	1986	1989			1986	1989				
18015										
18016	1986	1989			1986	1989				
18017	1983	1989			1983	1989				
18018	1983	1989			1983	1989				
18019	1987	1988			1987	1988				
19001										
19002	1962	1989			1962	1989				
19003	1973	1980			1973	1980				
19004	1960	1989			1960	1989				

STN NO	RIVER	STATION	G1	SYR1	G2	SYR2	G3	SYR3	CODE
19005	Almond	Almondell	AC	1962					
19006	Water of Leith	Murrayfield	AC	1963					
19007	Esk	Musselburgh	AB	1962					
19008	South Esk	Prestonholm	AB	1964					
19009	Bog Burn	Cobbinshaw	AC	1963					
19010	Braid Burn	Liberton	AC	1969					
19011	North Esk	Dalkeith Palace	AA	1963					
19012	Water of Leith	Colinton	AC	1986					
19013	Niddry Burn	Breast Mill							Z
19014	Brox Burn	Newliston	AA	1986					
19015	Almond	Livingston							Z
19017	Gogar Burn	Turnhouse	BA	1986					
19019	Swine Burn	Kirkliston							Z
19805	Spittle Burn	Ninemile Burn	AA						Z
19811	Almond	Whitburn	BA		AA	1979			
20001	Tyne	East Linton	AA	1961					
20002	West Peffer Burn	Luffness	AC	1966					
20003	Tyne	Spilmersford	AA	1965					
20004	East Peffer Burn	Lochhouses	AC	1967					
20005	Birns Water	Saltoun Hall	AA	1965					
20006	Biel Water	Belton House	BA	1973					
20007	Gifford Water	Lennoxlove	AA	1973					
20008	Brox Burn	Broxmouth	AA	1986					
20804	Thornton Burn	Thornton Mill	CA	1967					
20806	Hedderwick Burn	North Belton	AA	1969	CA	1973			
20807	Woodhall Burn	Woodhall	AA	1969					
20808	Cogtail Burn	Athelstane Ford	AA	1966					
20809	Salters Burn	Crichton Burn	AA						Z
21001	Fruid Water	Fruid	AA	1959	AC	1967			
21002	Whiteadder Water	Hungry Snout	AA	1959	AC	1965			
21003	Tweed	Peebles	AA	1959					
21004	Watch Water	Watch Water Res.	AC	1965					
21005	Tweed	Lyne Ford	AA	1961					
21006	Tweed	Boleside	AA	1961					
21007	Ettrick Water	Lindean	AB	1961					
21008	Teviot	Ormiston Mill	BA	1960					
21009	Tweed	Norham	BA	1962					
21010	Tweed	Dryburgh	AB	1960					
21011	Yarrow Water	Philiphaugh	AB	1963					
21012	Teviot	Hawick	AA	1963					

STN NO	UP1SYR	UP1FYR	UP2SYR	UP2FYR	PP1SYR	PP1FYR	PP2SYR	PP2FYR	OMIT1	OMIT2
19005										
19006										
19007	1962	1989								
19008	1964	1989								
19009										
19010										
19011	1963	1989			1963	1989				
19012										
19013										
19014	1986	1987			1986	1987				
19015										
19017	1986	1989								
19019										
19805										
19811	1986	1989			1986	1989				
20001	1961	1989			1961	1989				
20002										
20003	1965	1989			1965	1989				
20004										
20005	1965	1989			1965	1989				
20006	1973	1989								
20007	1973	1989			1973	1989				
20008	1986	1987			1986	1987				
20804										
20806	1969	1972			1969	1972				
20807	1969	1975			1969	1975				
20808	1966	1975			1966	1975				
20809										
21001	1959	1966			1959	1966				
21002	1959	1964			1959	1964				
21003	1959	1989			1959	1989				
21004										
21005	1961	1989			1961	1989				
21006	1961	1989			1961	1989				
21007	1961	1989								
21008	1960	1989								
21009	1962	1989								
21010	1960	1980							1961	1980
21011	1963	1989								
21012	1963	1989			1963	1989				

STN NO	RIVER	STATION	G1	SYR1	G2	SYR2	G3	SYR3	CODE
21013	Gala Water	Galashiels	AA	1964					
21014	Tweed	Kingledores	AA	1961					
21015	Leader Water	Earlston	AA	1966					
21016	Eye Water	Eyemouth Mill	BA	1967					
21017	Ettrick Water	Brockhoperig	AA	1965					
21018	Lyne Water	Lyne Station	AA	1968					
21019	Manor Water	Cademuir	AA	1968					
21020	Yarrow Water	Gordon Arms	AB	1967					
21021	Tweed	Sprouston	BA	1969					
21022	Whiteadder Water	Hutton Castle	AA	1969					
21023	Leet Water	Coldstream	AA	1970					
21024	Jed Water	Jedburgh	AA	1971					
21025	Ale Water	Ancrum	AB	1972					
21026	Tima Water	Deephope	AB	1973					
21027	Blackadder Water	Mouth Bridge	AA	1973					
21028	Menzion Burn	Menzion Farm	AA	1948					
21029	Tweed	Glenbreck							Z
21030	Megget Water	Henderland	AA	1968	AB	1982			
21031	Till	Etal	BA	1956					
21032	Glen	Kirknewton	BA	1966					
21033	Baddingsgill Burn	Intake							Z
21034	Yarrow Water	Craig Douglas	AA	1968	AC	1983			
21805	Whiteadder Water	Blanerne	AA	1960					
22001	Coquet	Morwick	BA	1963	AA	1976			
22002	Coquet	Bygate	AA	1957					
22003	Usway Burn	Shillmoor	AA	1957					
22004	Aln	Hawkhill	CA	1966	BA	1972			
22005	Wansbeck	Highford Weir							Z
22006	Blyth	Hartford Bridge	AA	1966					
22007	Wansbeck	Mitford	AB	1968					
22008	Alwin	Clennell	CA	1969	AA	1971			
22009	Coquet	Rothbury	AA	1972					
23001	Tyne	Bywell	BB	1956	BC	1980			
23002	Derwent	Eddys Bridge	AA	1954	AC	1965			
23003	North Tyne	Reaverhill	BA	1959	CA	1980			
23004	South Tyne	Haydon Bridge	CA	1962	AA	1972			
23005	North Tyne	Tarset	BA	1963	AC	1973			
23006	South Tyne	Featherstone	AA	1966					
23007	Derwent	Rowlands Gill	AB	1962	AC	1965			
23008	Rede	Rede Bridge	AA	1968					

STN NO	UP1SYR	UP1FYR	UP2SYR	UP2FYR	PP1SYR	PP1FYR	PP2SYR	PP2FYR	OMIT1	OMIT2
21013	1964	1989			1964	1989				
21014	1961	1989			1961	1989				
21015	1966	1989			1966	1989				
21016	1967	1989								
21017	1965	1989			1965	1989				
21018	1968	1989			1968	1989				
21019	1968	1989			1968	1989				
21020	1967	1989								
21021	1969	1989								
21022	1969	1989			1969	1989				
21023	1970	1989			1970	1989				
21024	1971	1989			1971	1989				
21025	1972	1989								
21026	1973	1989								
21027	1973	1989			1973	1989				
21028	1948	1952			1948	1952				
21029										
21030	1968	1989			1968	1981				
21031	1956	1980								
21032	1966	1989								
21033										
21034	1968	1982			1968	1982				
21805	1960	1975			1960	1975			1972	1973
22001	1963	1989			1976	1989				
22002	1957	1980			1957	1980			1980	
22003	1957	1980			1957	1980			1959	
22004	1972	1980								
22005										
22006	1966	1989			1966	1989				
22007	1968	1989								
22008	1971	1983			1971	1983				
22009	1972	1989			1972	1989				
23001	1956	1979								
23002	1954	1964			1954	1964				
23003	1959	1979								
23004	1972	1989			1972	1989				
23005	1963	1973								
23006	1966	1989			1966	1989				
23007	1962	1964								
23008	1968	1989			1968	1989				

STN NO	RIVER	STATION	G1	SYR1	G2	SYR2	G3	SYR3	CODE
23009	South Tyne	Alston	CA	1969					
23010	Tarset Burn	Greenhaugh	BA	1970					
23011	Kielder Burn	Kielder	AA	1970					
23012	East Allen	Wide Eals	CA	1971					
23013	West Allen	Hindley Wrae	CA	1971					
23014	North Tyne	Kielder (temp)	BA	1960					
23015	North Tyne	Barrasford	CC	1942					
23022	North Tyne	Uglydub							Z
23023	Tyne	Riding Mill							Z
23820	Tyne Reservoir	NGWC Reservoir Group	AC						S
24001	Wear	Sunderland Bridge	AB	1957					
24002	Gaunless	Bishops Auckland	BA	1958					
24003	Wear	Stanhope	AA	1958					
24004	Bedburn Beck	Bedburn	AA	1959					
24005	Browney	Burn Hall	AC	1954					
24006	Rookhope Burn	Eastgate	AA	1957					
24007	Browney	Lanchester	AA	1968					
24008	Wear	Witton Park	AB	1972					
24009	Wear	Chester-le-Street	AC	1977					
24801	Burnhope Burn	Burnhope Res.							Z
25001	Tees	Broken Scar	AC	1956					
25002	Tees	Dent Bank	BA	1956					
25003	Trout Beck	Moor House	AA	1957					
25004	Skerne	South Park	AC	1956					
25005	Leven	Leven Bridge	AC	1959					
25006	Greta	Rutherford Bridge	AA	1960					
25007	Clow Beck	Croft	AA	1961					
25008	Tees	Barnard Castle	AC	1966					
25009	Tees	Low Moor	CC	1969	AC	1974			
25010	Baydale Beck	Mowden Bridge	CC	1967					
25011	Langdon Beck	Langdon	AA	1969					
25012	Harwood Beck	Harwood	AA	1969					
25013	Billingham Beck	Thorpe Thewles	BB	1969					
25014	Morden Stell	Morden School	UA	1969					
25015	Woodham Burn	South Farm	UU	1969					
25018	Tees	Middleton-in-Teesdale	AC	1971					
25019	Leven	Easby	AA	1971					
25020	Skerne	Preston-Le-Skerne	CC	1972	AC	1978			
25021	Skerne	Bradbury	AC	1973					
25022	Balder	Balderhead Res.	AC	1974					

STN NO	UP1SYR	UP1FYR	UP2SYR	UP2FYR	PP1SYR	PP1FYR	PP2SYR	PP2FYR	OMIT1	OMIT2
23009										
23010	1970	1980								
23011	1970	1989			1970	1989				
23012										
23013										
23014	1960	1974								
23015										
23022										
23023										
23820										
24001	1957	1989								
24002	1958	1983								
24003	1958	1989			1958	1989				
24004	1959	1989			1959	1989				
24005										
24006	1957	1980			1957	1980			1959	
24007	1968	1983			1968	1983			1981	
24008	1972	1989								
24009										
24801										
25001										
25002	1956	1974								
25003	1957	1980			1957	1980				
25004										
25005										
25006	1960	1989			1960	1989				
25007	1961	1980			1961	1980				
25008										
25009										
25010										
25011	1969	1983			1969	1983				
25012	1969	1989			1969	1989				
25013	1969	1974							1970	
25014										
25015										
25018										
25019	1971	1989			1971	1989				
25020										
25021										
25022										

STN NO	RIVER	STATION	G1	SYR1	G2	SYR2	G3	SYR3	CODE
25023	Tees	Cow Green Res.	AC	1971					
25024	Chapel Beck	Guisborough	BA	1976					
25025	Hunderbeck	Blackton Bridge	BA	1978					
25026	Thorsgill	B6277	BA	1978					
25027	Carl Beck	Grassholme Res.	AA	1978					
25028	Greater Eggleshop	Middle End Farm	AA	1978					
25809	Bog Weir	Moor House							Z
25810	Syke Weir	Moor House							Z
25811	Long Weir	Moor House							Z
	Ouse Burn	Craghall	CC						Z
	Ouse Burn	Woolsington	CC						Z
	Team	Team Valley Trad. Est.	CC						Z
26001	West Beck	Wansford Bridge	CA	1953					
26002	Hull	Hempholme Lock	BC	1961					
26003	Foston Beck	Foston Mill	AA	1959					
26004	Gypsey Race	Bridlington	AA	1971					
26005	Gypsey Race	Boynton	AA	1981					
26006	Elmswell Beck	Little Driffield	CA	1984					
26007	Catchwater	Withernick	AA	1965					
27001	Nidd	Hunsingore Weir	CC	1935					
27002	Wharfe	Flint Mill Weir	BC	1955	BB	1980			
27003	Aire	Beal Weir	BC	1958	AC	1980			
27004	Calder	Newlands	BC	1960					
27005	Nidd	Gouthwaite Res.	CC	1936					
27006	Don	Hadfields Weir	AC	1965					
27007	Ure	Westwick Lock	AA	1958					
27008	Swale	Leckby Grange	BA	1955					
27009	Ouse	Skelton	CA	1969	BA	1970			
27010	Hodge Beck	Bransdale	BA	1936					
27011	Washburn	Lindley Wodd Res.	AC	1953					
27012	Hebden Water	High Greenwood	AC	1954					
27013	Ewden Beck	More Hall Res.	AC	1954					
27014	Rye	Little Habton	CA	1958					
27015	Derwent	Stamford Bridge	AA	1961					
27016	Little Don	Underbank Res.	AC	1956					
27017	Loxley	Damflask Reservoir	AC	1956					
27018	Ryburn	Ryburn Res.	BC	1956					
27019	Booth Dean Clough	Booth Wood Mill	AC	1956					
27020	Scout Dike Stream	Scout Dike Res.	BC	1956					
27021	Don	Doncaster	AC	1959					

STN NO	RIVER	STATION	G1	SYR1	G2	SYR2	G3	SYR3	CODE
37029	St. Osyth Brook	Main Road Bridge	AC	1960					
37030	Holland Brook	Cradle Bridge	CB	1962					
37031	Crouch	Wickford	AA	1976					
37032	Eastwood Brook	Lambeth Road							Z
37033	Eastwood Brook	Eastwood	AA	1975					
37034	Mardyke	Stifford	BC	1974					
37035	Salary Brook	Spring Valley							Z
37036	Ely Ouse Outfall	Great Sampford	AC	1971					
37037	Toppesfield Brook	Cornish Hall End	CC	1981					
37038	Wid	Margaretting	CC	1951					
37039	Blackwater	Langford	AC	1973					
37816	Blackwater	Beeleigh		1932					S
37817	Colne	Estuary							S
37818	Blackwater	Estuary							S
38001	Lee	Fieldes Weir	CC	1936	BC	1976			
38002	Ash	Mardock	BB		AB	1980			
38003	Mimram	Panshanger Park	AB	1952					
38004	Rib	Wadesmill	AC	1979					
38005	Ash	Easneye		1960					C
38006	Rib	Herts Training School	AC	1956					
38007	Canons Brook	Elizabeth Way, Harlow	BA	1965					
38011	Mimram	Fulling Mill	CC	1957					
38012	Stevenage Brook	Bragsbury Park	BC	1974					
38013	Upper Lee	Luton Hoo	AC	1960					
38014	Salmons Brook	Edmonton Goods Yard	BA	1956					
38015	Intercepting Drain	Enfield	AC	1969					
38016	Stanstead Bk Springs	Stanstead Mountfichet		1969					S
38017	Mimram	Whitwell	BC	1970					
38018	Upper Lee	Water Hall Farm	AB	1971					
38019	Salmons Brook	Montague Road	CC	1971					
38020	Cobbins Brook	Sewardstone Road	CC	1971					
38021	Turkey Brook	Albany Park	BC	1971					
38022	Pymmes Brook	Silver St, Edmonton	AA	1972					
38023	Lee Flood Relief	Low Hall	BC	1980					
38024	Small River Lee	Ordnance Road	AA	1973					
38025	Pymmes Brook	Alcazar	BC	1954					
38026	Pincey Brook	Sheering Hall	AA	1974					
38027	Stort	Glen Faba	CC	1985					
38028	Stanstead Brook	Gypsy Lane	AC	1976					
38029	Quin	Griggs Bridge	BB	1978					

STN NO	UP1SYR	UP1FYR	UP2SYR	UP2FYR	PP1SYR	PP1FYR	PP2SYR	PP2FYR	OMIT1	OMIT2
36005	1962	1989			1962	1989				
36006										
36007	1960	1989			1960	1989			1963	
36008										
36009	1968	1989			1968	1989			1969	1970
36010	1968	1989			1968	1989				
36011										
36012										
36013										
36015										
36016										
36017										
37001	1962	1989								
37002										
37003										
37004										
37005	1959	1989							1982	
37006										
37007										
37008	1965	1989								
37009	1962	1989								
37010										
37011	1963	1989			1963	1989				
37012	1963	1989							1982	
37013	1963	1989								
37014										
37015										
37016	1965	1970								
37017										
37018										
37019	1965	1989			1974	1989				
37020	1970	1989								
37021	1970	1989								
37022										
37023										
37024									1982	
37025										
37026										
37027										
37028										

STN NO	RIVER	STATION	G1	SYR1	G2	SYR2	G3	SYR3	CODE
36005	Brett	Hadleigh	AA	1962					
36006	Stour	Langham	AC	1962					
36007	Belchamp Brook	Bardfield Bridge	AA	1960					
36008	Stour	Westmill	AC	1960					
36009	Brett	Cockfield	AA	1968					
36010	Bumpstead Brook	Broad Green	AA	1968					
36011	Stour Brook	Sturmer	AC	1968					
36012	Stour	Kedington	AC	1968					
36013	Brett	Higham	CC	1971					
36015	Stour	Lamarsh	AC	1972					
36016	Ramsey	Great Oakley	BC	1970					
36017	Ely Ouse Outfall	Kirtling Green	AC	1971					
37001	Roding	Redbridge	CB	1950	BB	1962	AB	1974	
37002	Chelmer	Rushes Lock	BC	1932					
37003	Ter	Crabbs Bridge	AC	1932					
37004	Blackwater	Langford							Z
37005	Colne	Lexden	AB	1959					
37006	Can	Beachs Mill	AC	1962					
37007	Wid	Writtle	AC	1964					
37008	Chelmer	Springfield	AB	1965					
37009	Brain	Guithavon Valley	AB	1962					
37010	Blackwater	Appleford Bridge	AC	1962					
37011	Chelmer	Churchend	AA	1963					
37012	Colne	Poolstreet	AB	1963					
37013	Sandon Brook	Sandon Bridge	AB	1963					
37014	Roding	High Ongar	BC	1963	AC	1974			
37015	Cripsey Brook	Chipping Ongar	BC	1977	AC	1981			
37016	Pant	Copford Hall	AB	1965	AC	1971			
37017	Blackwater	Stisted	AC	1969					
37018	Ingrebourne	Gaynes Park	BC	1970	AC	1974			
37019	Beam	Bretons Farm	BA	1965	AA	1974			
37020	Chelmer	Felsted	AB	1970					
37021	Roman	Bounstead Bridge	CB		AB	1970			
37022	Holland Brook	Thorpe Le Soken	CC	1970					
37023	Roding	Loughton	BC	1971	AC	1974			
37024	Colne	Earls Colne	CA	1971					
37025	Bourne Brook	Perces Bridge	CB	1965					
37026	Tenpenny Brook	Tenpenny Bridge	AC	1961					
37027	Sixpenny Brook	Ship House Bridge	AC	1960					
37028	Bentley Brook	Saltwater Bridge	AC	1960					

STN NO	UP1SYR	UP1FYR	UP2SYR	UP2FYR	PP1SYR	PP1FYR	PP2SYR	PP2FYR	OMIT1	OMIT2
34005	1961	1989								
34006	1963	1974	1980	1989	1963	1974	1980	1989		
34007	1966	1974	1980	1989	1966	1974	1980	1989		
34008	1966	1989			1966	1989				
34010	1968	1989							1988	
34011	1967	1989			1967	1989				
34012	1966	1969	1975	1989	1966	1969	1975	1989		
34013										
34014	1969	1988			1969	1988			1987	
34016										
34018	1979	1986			1979	1986				
34019	1974	1988							1987	1988
34020	1966	1986								
34021										
34811										
34812										
34831										
35001										
35002										
35003	1961	1989								
35004	1965	1989								
35008	1964	1989								
35009										
35010										
35011	1969	1987								
35013	1970	1988								
35014										
35015										
35816										
35817										
35821	1980	1987								
35822										
35823	1976	1987								
35825	1980	1987			1980	1987				
35826										
35827	1975	1987								
36001										
36002	1960	1989			1960	1989				
36003	1960	1989			1960	1989				
36004										

STN NO	RIVER	STATION	G1	SYR1	G2	SYR2	G3	SYR3	CODE
34005	Tud	Costessey Park	AB	1961					
34006	Waveney	Needham Mill	AA	1963	AC	1975	AA	1980	
34007	Dove	Oakley Park	AA	1966	AC	1975	AA	1980	
34008	Ant	Honing Lock	AA	1966					
34010	Waveney	Billingford Bridge	BB	1968					
34011	Wensum	Fakenham	AA	1967					
34012	Burn	Burnham Overy	AA	1966	AC	1970	AA	1975	
34013	Waveney	Ellingham Mill	CB	1972					
34014	Wensum	Swanton Morely Total	AA	1969					
34016	Glaven	Bayfield							Z
34018	Stiffkey	Warham All Saints	CB	1972	AB	1979	CB	1987	
34019	Bure	Horstead Mill	AB	1974					
34020	Stiffkey	Little Walsingham	AB						P
34021	Mundesley Beck	Mundesley Hospital	BC						Z
34811	Wensum	Swanton Morely 3 Arch		1969					C
34812	Waveney	Ellingham Sluice		1972					C
34831	Broome Beck	Broome Bridge							Z
35001	Gipping	Constantine Weir	CC	1964					
35002	Deben	Naunton Hall	AC	1964					
35003	Alde	Farnham	AB	1961					
35004	Ore	Beversham Bridge	AB	1965					
35008	Gipping	Stowmarket	AB	1964					
35009	Blyth	Blyford Bridge							Z
35010	Gipping	Bramford	AC	1969					
35011	Belstead Brook	Belstead	AB	1969					
35013	Blyth	Holton	AB	1970					
35014	Mill River	Bucklesham	CC	1948					
35015	Newbourn Stream	Newbourn	CC	1948					
35816	Fromus	Benhall Bridge							Z
35817	Shottisham	Shottisham							Z
35821	Finn	Playford	AB						P
35822	Haughley Watercourse	Newton							Z
35823	Wang	Wangford Bridge	AB						P
35825	Stonham Watercourse	Creeting St.Mary	AA						P
35826	Minsmere	Middleton							Z
35827	Lothingland 100	Hulver Bridge	BB						P
36001	Stour	Stratford St.Mary	BC	1928					
36002	Glem	Glemsford	AA	1960					
36003	Box	Polstead	AA	1960					
36004	Chad Brook	Long Melford	CA	1965					

STN NO	UP1SYR	UP1FYR	UP2SYR	UP2FYR	PP1SYR	PP1FYR	PP2SYR	PP2FYR	OMIT1	OMIT2
33029	1965	1989								
33030										
33031	1971	1986								
33032	1965	1989								
33033										
33034	1968	1989			1968	1989				
33035										
33037	1969	1989			1969	1989				
33039										
33040	1965	1989								
33044	1967	1967	1972	1989	1967	1967	1972	1989		
33045	1967	1989			1967	1989				
33046	1967	1989			1967	1989				
33048	1969	1987			1969	1987				
33049	1973	1980			1973	1980				
33050	1960	1989			1960	1989				
33051	1964	1988							1973	1989
33052	1963	1986			1963	1986				
33053										
33054	1976	1989			1976	1989				
33055	1963	1989								
33056										
33057										
33058	1978	1989								
33059										
33060										
33061										
33062										
33063	1980	1989			1980	1989				
33064										
33065										
33066	1981	1989			1981	1989				
33067										
33068										
33809	1971	1975			1971	1975			1971	1972
33810										
34001	1959	1989			1959	1989				
34002	1957	1989			1957	1989				
34003	1959	1989			1959	1989				
34004	1960	1989								

STN NO	RIVER	STATION	G1	SYR1	G2	SYR2	G3	SYR3	CODE
33029	Stringside	White Bridge	AB	1965					
33030	Clipstone Brook	Clipstone	AC	1957					
33031	Broughton Brook	Broughton	AB	1971					
33032	Heacham	Heacham	AB	1965					
33033	Hiz	Arlesey	AC	1973					
33034	Little Ouse	Abbey Heath	AA	1968					
33035	Ely Ouse	Denver Complex	BC	1958					
33037	Bedford Ouse	Newport Pagnell Weir	AA	1969					
33039	Bedford Ouse	Roxton	AC	1972					
33040	Rhee	Ashwell	AB	1965					
33044	Thet	Bridgham	AA	1967	AC	1968	AA	1972	
33045	Wittle	Quidenham	AA	1967					
33046	Thet	Red Bridge	AA	1967					
33048	Larling Brook	Stonebridge	AA	1969					
33049	Stanford Water	Buckenham Tofts	AA	1973					
33050	Snail	Fordham	AA	1960					
33051	Cam	Chesterford	AB	1964					
33052	Swaffham Lode	Swaffham Bulbeck	AB	1963					
33053	Granta	Stapleford	BC	1949					
33054	Babingley	Castle Rising	AA	1976					
33055	Granta	Babraham	AC	1963	AB	1966			
33056	Quy Water	Lode	CC	1965	AC	1976			
33057	Ouzel	Leighton Buzzard	AC	1976					
33058	Ouzel	Bletchley	AB	1978					
33059	Cut-off Channel	Tolgate	AC	1969					
33060	Kings Dyke	Stanground	CC	1969					
33061	Shep	Fowlmere One							C
33062	Guilden Brook	Fowlmere Two	AC	1964					
33063	Little Ouse	Knettishall	AA	1980					
33064	Whaddon Brook	Whaddon	AC	1980					
33065	Hiz	Hitchin	AC	1980					
33066	Granta	Linton	AA	1981					
33067	New River	Burwell	CB	1982					
33068	Cheney Water	Gatley End	AC	1982					
33809	Bury Brook	Bury Weir	AA	1971					
33810	Bedford Ouse	Newport Pagnell Weir		1969					C
34001	Yare	Colney	AA	1959					
34002	Tas	Shotesham	AA	1957					
34003	Bure	Ingworth	AA	1959					
34004	Wensum	Costessey Mill	BA	1960					

STN NO	UP1SYR	UP1FYR	UP2SYR	UP2FYR	PP1SYR	PP1FYR	PP2SYR	PP2FYR	OMIT1	OMIT2
32025										
32026	1970	1988			1970	1988				
32027	1971	1985			1971	1985				
32029	1973	1979							1973	
32030	1979	1982			1979	1982				
32031	1982	1988			1982	1988				
32801										
32803										
32804										
32811										
32813										
32814										
33001										
33002	1933	1989							1933	1934
33003	1936	1987							1937	1938
33004										
33005										
33006	1956	1980								
33007	1966	1989								
33008										
33009	1955	1986								
33010										
33011	1948	1989			1948	1989			1948	1949
33012										
33013	1953	1989			1953	1989				
33014	1960	1989			1960	1989				
33015	1962	1978	1982	1988	1962	1978	1982	1988		
33016										
33017										
33018	1962	1989			1962	1989				
33019	1962	1989			1962	1989				
33020	1963	1989							1967	1972
33021	1962	1989								
33022	1959	1989								
33023										
33024	1949	1989								
33025										
33026										
33027	1965	1989								
33028										

STN NO	RIVER	STATION	G1	SYR1	G2	SYR2	G3	SYR3	CODE
32025	Nene/Whilton	Surney Bridges	BC	1971					
32026	Nene/Brampton	Brixworth	AA	1970					
32027	Billing Brook	Chesterton	AA	1971					
32029	Flore	Experimental Catchment	BA	1973					
32030	Coton Mill Stream	Ravensthorpe	AA	1979					
32031	Wootton Brook	Wootton Park	AA	1982					
32801	Flore Stream	Flore							Z
32803	Sywell Brook	Sywell Reservoir							Z
32804	Ise Brook	Harrowden Total							Z
32811	Nene/Kislingbury	Upton Bypass	AC	1969					C
32813	Nene/Brampton	St.Andrews Mill Bypass	AC	1970					C
32814	Nene	Northampton Total	CC	1971					S
33001	Bedford Ouse	Brownshill Staunch	CC	1936					
33002	Bedford Ouse	Bedford	BB	1933					
33003	Cam	Bottisham	BA	1936					
33004	Lark	Isleham	CC	1936					
33005	Bedford Ouse	Thornborough Mill	AC	1951					
33006	Wissey	Northwold	BB	1956	CB	1981			
33007	Nar	Marham	CA	1953	BA	1966			
33008	Little Ouse	Thetford No.1 Staunch	CA	1958					
33009	Bedford Ouse	Harrold Mill	BA	1955					
33010	Bedford Ouse	Bromham Mill							Z
33011	Little Ouse	County Bridge Euston	AA	1948					
33012	Kym	Meagre Farm	BC	1960					
33013	Sapiston	Rectory Bridge	AC	1949	AA	1953			
33014	Lark	Temple	AA	1960					
33015	Ouzel	Willen	AA	1962	AC	1979	AA	1982	
33016	Cam	Jesus Lock	CC	1959					
33017	Bedford Ouse	St.Ives Staunch							Z
33018	Tove	Cappenham Bridge	AA	1962					
33019	Thet	Melford Bridge	AA	1962					
33020	Alconbury Brook	Brampton	BB	1963					
33021	Rhee	Burnt Mill	AB	1962					
33022	Ivel	Blunham	AB	1959					
33023	Lea Brook	Beck Bridge	BC	1962					
33024	Cam	Dernford	AB	1949					
33025	Babingly	West Newton Mill	CA	1963					
33026	Bedford Ouse	Offord	AC	1970					
33027	Rhee	Wimpole	AB	1965					
33028	Flit	Shefford	AC	1966					

STN NO	UP1SYR	UP1FYR	UP2SYR	UP2FYR	PP1SYR	PP1FYR	PP2SYR	PP2FYR	OMIT1	OMIT2
31013										
31014										
31015										
31016	1969	1988			1969	1988			1969	
31017	1970	1985			1970	1985				
31018	1970	1985								
31019	1970	1988			1970	1988				
31020	1970	1985								
31021										
31022	1970	1988			1970	1988				
31023	1972	1988			1972	1988				
31024	1971	1988							1974	1977
31025	1978	1988			1978	1988				
31026	1978	1988			1978	1988				
31027										
31028										
31802										
31804										
31811										
31813										
31814										
32001										
32002										
32003	1938	1989			1938	1989				
32004	1943	1989								
32006	1939	1988								
32007										
32008										
32009										
32010										
32012	1968	1982			1968	1982				
32013										
32014										
32015	1969	1988			1969	1988				
32016	1971	1988			1971	1988				
32018	1969	1983								
32019	1970	1988			1970	1988				
32020	1970	1985								
32023										
32024	1971	1985			1971	1985			1973	1976

STN NO	RIVER	STATION	G1	SYR1	G2	SYR2	G3	SYR3	CODE
31013	East Glen	Irnham	AC	1969					
31014	Grimsthorpe Brook	Grimsthorpe Park	AC	1969					
31015	Chater	Ridlington	CA	1969	CB	1975			
31016	North Brook	Empingham	AA	1969					
31017	Stonton Brook	Welham Road Bridge	AA	1970					
31018	Langton Brook	Welham Road Bridge	AB	1970					
31019	Medbourne Brook	Medbourne	AA	1970					
31020	Morcott Brook	South Luffenham	AB	1970					
31021	Welland	Ashley	AC	1970					
31022	Jordan	Market Harborough	AA	1970					
31023	West Glen	Easton Road	AA	1972					
31024	Holywell Brook	Holywell	AB	1971					
31025	Gwash (South Arm)	Manton	AA	1978					
31026	Egleton Brook	Egleton	AA	1978					
31027	Bourne Eau	Mays Sluice Bourne	AC	1981					
31028	Gwash	Church Bridge	AC	1982					
31802	Glen	Kates Bridge	CC	1987					C
31804	Welland	Tallington Total	CC	1987					C
31811	Glen	Kings Street Bridge	CC	1960					C
31813	Welland	West Deeping Mill St	CC	1967					C
31814	Welland	Lolham Mill Stream	CC	1967					C
32001	Nene	Orton	BC	1939					
32002	Willow Brook	Fotheringhay	AC	1938					
32003	Harpers Brook	Old Mill Bridge	AA	1938					
32004	Ise Brook	Harrowden Old Mill	AB	1943					
32006	Nene/Kislingbury	Upton	BB	1939	AB	1970			
32007	Nene Brampton	St. Andrews	CA	1939	CC	1955	AC	1970	
32008	Nene/Kislingbury	Dodford	AC	1945					
32009	Willow Brook	Blatherwyke	CC	1980					
32010	Nene	Wansford							Z
32012	Wootton Brook	Lady Bridge	AA	1968					
32013	Nene	Wollaston							Z
32014	Nene	Lilford							Z
32015	Willow Brook	Tunwell Loop	AA	1969					
32016	Willow Brook	Corby South	AA	1971					
32018	Ise	Barford Bridge	AB	1969	BB	1984			
32019	Slade Brook	Kettering	AB	1970	AA	1988			
32020	Wittering Brook	Wansford	AB	1970					
32023	Grendon Brook	Ryeholmes Bridge	CA	1970					
32024	Southwick Brook	Southwick	AA	1971					

STN NO	UP1SYR	UP1FYR	UP2SYR	UP2FYR	PP1SYR	PP1FYR	PP2SYR	PP2FYR	OMIT1	OMIT2
29009	1974	1989							1978	
30001	1959	1976								
30002										
30003	1962	1989							1976	
30004	1962	1989								
30005										
30006										
30007										
30008										
30009										
30010										
30011	1971	1989			1971	1989				
30012	1970	1989								
30013	1976	1989							1976	1988
30014										
30015	1976	1989								
30016										
30017	1986	1989			1986	1989				
30018	1983	1988							1984	
30019										
30020										
30021										
30022										
30023										
30025										
30803	1973	1975			1973	1975				
30811										
30812										
30813										
31001										
31002										
31004										
31005										
31006	1967	1974			1967	1974				
31007										
31008										
31009										
31010	1968	1988			1968	1974				
31011	1969	1988								
31012	1969	1985								

STN NO	RIVER	STATION	G1	SYR1	G2	SYR2	G3	SYR3	CODE
29009	Ancholme	Toft Newton	BB	1974					
30001	Witham	Claypole Mill	AB	1959	AC	1977			
30002	Barlings Eau	Langworth Bridge	CC	1960	AC	1966			
30003	Bain	Fulsby Lock	AB	1962					
30004	Partney Lymn	Partney Mill	AB	1962					
30005	Witham	Saltersford Total	AC	1968					
30006	Slea	Leasingham Mill	AC	1974					
30007	South Forty Foot Dr	Black Sluice	CU						Z
30008	Witham	Bargate Sluice	CU						Z
30009	Witham	Friskerton Sluice	CU						Z
30010	Witham	Grand Sluice Boston	CU						Z
30011	Bain	Goulceby Bridge	AA	1971					
30012	Stainfield Beck	Stainfield	BA	1970					
30013	Heighington Beck	Heighington	AB	1976					
30014	Pointon Lode	Pointon	AC	1972					
30015	Cringle Brook	Stoke Rochford	BA	1976					
30016	Maud Foster Drain	Maud Foster Sluice	C						Z
30017	Witham	Colsterworth	AC	1978	AA	1986			
30018	Honington Beck	Honington	BB	1983					
30019	Dunston Beck	Waneham							Z
30020	Scopwick Beck	Scopwick							Z
30021	Bain	Tattershall							Z
30022	Rippingale	Rippingale Running Dyk							Z
30023	Hagnaby Beck	Hagnaby Beck End							Z
30025	Bain	Horncastle							Z
30803	Miningsley Beck	Revesby Reservoir	AA	1973					
30811	Bain	Fulsby Lock Bypass	CB	1973					C
30812	Witham	Saltersford Notch	CC	1968					C
30813	Witham	Saltersford Main Crest	CC	1973					C
31001	Eye Brook	Eye Brook Reservoir	AC	1937					
31002	Glen	Kates Br & King St Br	CC	1960	AC	1972			
31004	Welland	Tallington	BC	1967					
31005	Welland	Tixover							Z
31006	Gwash	Belmesthorpe	AA	1967	AC	1975			
31007	Welland	Barrowden	AC	1968					
31008	East Glen	Manthorpe	AC	1968					
31009	West Glen	Shillingthorpe	CB	1970					
31010	Chater	Fosters Bridge	AA	1968	AB	1975			
31011	West Glen	Burton Coggles	AB	1969					
31012	Tham	Little Bytham	AB	1969	CB	1986			

STN NO	UP1SYR	UP1FYR	UP2SYR	UP2FYR	PP1SYR	PP1FYR	PP2SYR	PP2FYR	OMIT1	OMIT2
28060	1972	1984								
28061										
28062										
28065										
28066	1973	1989			1973	1989				
28067										
28068										
28669										
28070	1965	1982								
28071										
28072	1975	1984								
28073										
28074										
28075	1979	1982			1979	1982				
28076										
28077										
28079	1981	1989			1981	1989				
28080										
28081										
28082	1971	1989								
28083	1982	1989								
28084										
28085	1935	1940	1957	1989						
28086	1971	1989							1984	
28087										
28091	1984	1989								
28093	1986	1989								
28094										
28095										
28101										
28102										
28804										
28871										
28872										
29001										
29002	1974	1989			1974	1989				
29003	1968	1989								
29004	1968	1976								
29005	1971	1989			1971	1989				
29006										

STN NO	RIVER	STATION	G1	SYR1	G2	SYR2	G3	SYR3	CODE
28060	Dover Beck	Lowdham	AB	1972					
28061	Churnet	Basford Bridge	AC	1975					
28062	Trent	Fledborough							Z
28065	Trent	Torksey							Z
28066	Cole	Coleshill	AA	1973					
28067	Derwent	Church Wilne	BC	1973					
28068	Lothkill	Pickering Wood							Z
28669	Tame	Tamworth							Z
28070	Burbage Brook	Burbage	BA	1965					
28071	Amber	Ogston Reservoir							Z
28072	Greet	Southwell	AB	1975					
28073	Ashop	Ashop Diversion	BC	1976					
28074	Soar	Kegworth	BC	1978					
28075	Derwent	Slippery Stones	AA	1979					
28076	Tutbury Millfleam	Rolleston	BC	1980					
28077	Spondon Outfall	Spondon Rec. Works	BC	1980					
28079	Meece	Shallowford	AA	1981					
28080	Tame	Lea Marston Lakes	AC	1957					
28081	Tame	Bescot	BC	1982					
28082	Soar	Littlethorpe	BB	1971					
28083	Trent	Darlaston	BB	1982					
28084	Tame	Sandwell	AC						Z
28085	Derwent	Derby St Marys	AB	1935	AC	1941	AB	1957	
28086	Sence	South Wigston	BB	1971					
28087	Tame	Perry Park	AC						Z
28091	Ryton	Blyth	AB	1984					
28093	Soar	Pilling Lock	AB	1986					
28094	Blithe	Castle Farm	BB						Z
28095	Tame	Hopwas Bridge	BC						Z
28101	Tame	Sheepwash							Z
28102	Blythe	Whitacre	AC	1987					
28804	Trent	Trent Bridge	CB						Z
28871	Erewash	Stapleford RH	CC	1965					C
28872	Leen	Nottingham	CB	1981					C
29001	Waithe Beck	Brigsley	AC	1960					
29002	Great Eau	Claythorpe Mill	CA	1962	AA	1974			
29003	Lud	Louth	AB	1968					
29004	Ancholme	Bishopbridge	BB	1968	BC	1977			
29005	Rase	Bishopbridge	AA	1971					
29006	Ancholme	Ferriby Sluice							Z

STN NO	UP1SYR	UP1FYR	UP2SYR	UP2FYR	PP1SYR	PP1FYR	PP2SYR	PP2FYR	OMIT1	OMIT2
28020	1954	1982								
28021										
28022	1968	1989								
28023										
28024	1967	1989								
28025	1966	1984								
28026										
28027										
28028										
28029	1966	1984								
28030	1967	1984								
28031	1968	1989			1968	1989				
28032										
28033	1965	1982			1965	1982				
28034										
28035	1981	1984								
28036										
28037										
28038	1969	1982								
28039										
28040	1983	1989								
28041	1968	1982			1968	1982				
28042										
28043	1968	1989							1975	1976
28044	1969	1984								
28045										
28046	1969	1989			1969	1989				
28047										
28048										
28049										
28050										
28051										
28052										
28053	1976	1983								
28054	1971	1984								
28055	1971	1982								
28056										
28657										
28058	1974	1984			1974	1984				
28059										

STN NO	RIVER	STATION	G1	SYR1	G2	SYR2	G3	SYR3	CODE
28020	Churnet	Rocester	BB	1954					
28021	Derwent	Draycott	CC	1965					
28022	Trent	North Muskham	BB	1968					
28023	Wye	Ashford	CA	1965					
28024	Wreake	Syston Mill	AB	1967					
28025	Sence	Ratcliffe Culey	AB	1966					
28026	Anker	Polesworth	AC	1966					
28027	Erewash	Stapleford	BC	1965					
28028	Soar	Wanlip	BC	1972					
28029	Kingston Brook	Kingston Hall	BB	1966					
28030	Black Brook	Onebarrow	BA	1967					
28031	Manifold	Ilam	AA	1968					
28032	Meden	Church Warsop	BC	1965					
28033	Dove	Hollinsclough	AA	1965					
28034	Maun	Haughton	CC						Z
28035	Leen	Nottingham	BB	1981					
28036	Poulter	Twyford Bridge	BC	1969					
28037	Derwent	Mytham Bridge	CC	1978					
28038	Manifold	Hulme End	BA	1969					
28039	Rea	Calthorpe Park	AC	1967					
28040	Trent	Stoke-on-Trent	AC	1968	AB	1983			
28041	Hamps	Waterhouses	AA	1968					
28042	Churnet	Cheddleton	BC						Z
28043	Derwent	Chatsworth	AB	1968					
28044	Poulter	Cuckney	AB	1969					
28045	Meden	Bothamsall	CC	1965					
28046	Dove	Izaak Walton	AA	1969					
28047	Oldcoates Dyke	Blyth	AC	1970					
28048	Amber	Wingfield Park	AC	1971					
28049	Ryton	Worksop	BC	1970					
28050	Torne	Auckley	BC	1971					
28051	Soar	Narborough	BB						Z
28052	Sow	Great Bridgeford	AC	1971					
28053	Penk	Penkridge	BB	1976					
28054	Sence	Blaby	BB	1971					
28055	Ecclesbourne	Duffield	AB	1971					
28056	Rothley Brook	Rothley	AC	1973					
28657	Trent	Cromwell Lock							Z
28058	Henmore Brook	Ashbourne	AA	1974					
28059	Maun	Mansfield	CC	1966					

STN NO	UP1SYR	UP1FYR	UP2SYR	UP2FYR	PP1SYR	PP1FYR	PP2SYR	PP2FYR	OMIT1	OMIT2
27065										
27066	1984	1989								
27067	1984	1989			1984	1989				
27068										
27069	1984	1988								
27070	1986	1989								
27071	1980	1989			1980	1989				
27072	1984	1989			1984	1989			1984	1985
27073	1984	1989								
27074										
27075	1986	1989			1986	1989				
27076	1986	1989								
27077	1986	1989								
27079										
27080										
27082										
27083	1987	1989								
27852										
28001										
28002										
28003	1955	1982								
28004										
28005										
28006										
28007										
28008	1953	1989							1959	
28009	1958	1989								
28010	1957	1986								
28011	1958	1989							1959	
28012										
28013										
28014	1960	1977								
28015										
28016										
28017										
28018	1961	1989								
28019										

STN NO	RIVER	STATION	G1	SYR1	G2	SYR2	G3	SYR3	CODE
27065	Holme	Queens Mill	AC	1979					
27066	Blackburn Brook	Ashlowes	AB	1984					
27067	Sheaf	Highfield Road	AA	1984					
27068	Ryburn	Ripponden	AC	1984					
27069	Wiske	Kirby Wiske	AB	1984					
27070	Eller Beck	Skipton	AB	1986					
27071	Swale	Crakehill	AA	1980					
27072	Worth	Keighley	AA	1984					
27073	Brompton Beck	Snaignton Ings	AB	1984					
27074	Spen Beck	Northorpe	AC	1984					
27075	Bedale Beck	Leeming	AA	1986					
27076	Bielby Beck	Thornton lock	AB	1986					
27077	Bradford Beck	Shipley	AB	1986					
27079	Calder	Methley	AC						Z
27080	Aire	Fleet Weir	AC	1986					
27082	Cundall Beck	Bat Bridge	AC						Z
27083	Foss	Huntingdon	AB	1987					
27852	Little Don	Langsett Reservoir	AC						Z
	Mires Beck	North Cave	AB						Z
	Oulton Beck	Farrer Lane	AA						Z
	Skell	Alma Weir	AC						Z
28001	Derwent	Yorkshire Bridge	AC	1933					
28002	Blithe	Hamstall Ridware	BC	1937					
28003	Tame	Water Orton	BB	1955					
28004	Tame	Lea Marston	BC	1956					
28005	Tame	Elford	CC	1955					
28006	Trent	Great Haywood	BC	1957					
28007	Trent	Shardlow	CC	1957					
28008	Dove	Rocester Weir	BA	1953					
28009	Trent	Colwick	AB	1958					
28010	Derwent	Longbridge Weir	BC	1935	BB	1957			
28011	Derwent	Matlock Bath	BB	1958					
28012	Trent	Yoxhall	BC	1959					
28013	Soar	Zouch							Z
28014	Sow	Milford	BB	1960					
28015	Idle	Mattersey	AC	1965					
28016	Ryton	Serlby Park	CC	1965					
28017	Devon	Cotham	CA	1966					
28018	Dove	Marston-on-Dove	AB	1961					
28019	Trent	Drakelow Park	AC	1966					

STN NO	UP1SYR	UP1FYR	UP2SYR	UP2FYR	PP1SYR	PP1FYR	PP2SYR	PP2FYR	OMIT1	OMIT2
27022										
27023	1960	1989								
27024	1961	1980			1961	1980				
27025										
27026										
27027	1961	1975			1961	1975				
27028										
27029										
27030										
27031										
27032	1966	1988			1966	1988				
27033	1969	1989								
27034	1967	1989			1967	1989				
27035	1968	1989								
27036										
27038	1970	1989			1970	1989				
27039										
27040	1970	1989								
27041	1973	1989			1973	1989				
27042	1972	1989								
27043	1974	1989			1974	1989				
27044	1974	1989								
27047	1972	1989			1985	1989			1981	
27048										
27049	1974	1989			1974	1989				
27050	1970	1989			1970	1989				
27051	1972	1989			1972	1989				
27052	1976	1989								
27053										
27054	1974	1989			1974	1989				
27055	1974	1989			1974	1989				
27056	1974	1989			1974	1989			1975	1988
27057	1974	1989			1974	1989				
27058	1974	1989			1974	1989				
27059	1977	1989								
27060	1979	1989			1979	1989				
27061										
27062										
27063										
27064	1979	1989			1979	1989				

STN NO	RIVER	STATION	G1	SYR1	G2	SYR2	G3	SYR3	CODE
27022	Don	Rotherham	CC	1960					
27023	Dearne	Barnsley Weir	AB	1960					
27024	Swale	Richmond	AA	1961					
27025	Rother	Woodhouse Mill	AC	1961					
27026	Rother	Whittington	AC	1963					
27027	Wharfe	Ilkley	AA	1961					
27028	Aire	Armley	CC	1961	BC	1972	AC	1978	
27029	Calder	Elland	AC	1961					
27030	Dearne	Adwick	AC	1963					
27031	Colne	Colnebridge	AC	1964					
27032	Hebden Beck	Hebden	AA	1966					
27033	Sea Cut	Scarborough	AB	1969					
27034	Ure	Kilgram Bridge	AA	1967					
27035	Aire	Kildwick Bridge	AB	1968					
27036	Derwent	Malton	CA	1969					
27038	Costa Beck	Gatehouses	AA	1970					
27039	Holme	Digley Res.	AC	1967					
27040	Doe Lea	Staveley	AB	1970					
27041	Derwent	Buttercrambe	AA	1973					
27042	Dove	Kirkby Mills	AB	1972					
27043	Wharfe	Addingham	AA	1974					
27044	Blackfoss Beck	Sandhills Bridge	AB	1974					
27047	Snaizeholme Beck	Low Houses	BA	1972	AA	1985			
27048	Derwent	West Ayton	AC	1972					
27049	Rye	Ness	AA	1974					
27050	Esk	Sleights	AA	1970					
27051	Crimple	Burn Bridge	AA	1972					
27052	Whitting	Sheepbridge	AB	1976					
27053	Nidd	Birstwith	AC	1975					
27054	Hodge Beck	Cherry Farm	AA	1974					
27055	Rye	Broadway Foot	AA	1974					
27056	Pickering Beck	Ings Bridge	AA	1974					
27057	Seven	Normansby	AA	1974					
27058	Riccal	Crook House Farm	AA	1974					
27059	Laver	Ripon	AB	1977					
27060	Kyle	Newton-on-Ouse	AA	1979					
27061	Colne	Longroyd Bridge	AC	1978					
27062	Nidd	Skip Bridge	AC	1979					
27063	Dibb	Grimwith Reservoir	AC	1980					
27064	Went	Walden Stubbs	AA	1979					

STN NO	UP1SYR	UP1FYR	UP2SYR	UP2FYR	PP1SYR	PP1FYR	PP2SYR	PP2FYR	OMIT1	OMIT2
25023										
25024	1976	1977								
25025	1978	1983								
25026	1978	1983								
25027	1978	1984			1978	1984				
25028	1978	1984			1978	1984				
25809										
25810										
25811										
26001										
26002										
26003	1959	1989			1959	1989				
26004	1971	1985			1971	1985			1982	
26005	1981	1989			1981	1989				
26006										
26007	1965	1979			1965	1979				
27001										
27002	1980	1989								
27003										
27004										
27005										
27006										
27007	1958	1989			1958	1989				
27008	1955	1984								
27009	1970	1989								
27010	1936	1979								
27011										
27012										
27013										
27014										
27015	1961	1975			1961	1975				
27016										
27017										
27018										
27019										
27020										
27021										

STN NO	UP1SYR	UP1FYR	UP2SYR	UP2FYR	PP1SYR	PP1FYR	PP2SYR	PP2FYR	OMIT1	OMIT2
37029										
37030										
37031	1976	1987			1976	1987				
37032										
37033	1975	1989			1975	1989				
37034										
37035										
37036										
37037										
37038										
37039										
37816										
37817										
37818										
38001										
38002	1980	1989								
38003	1952	1989								
38004										
38005										
38006										
38007	1965	1989								
38011										
38012										
38013										
38014	1956	1989								
38015										
38016										
38017										
38018	1971	1989								
38019										
38020										
38021										
38022	1972	1989			1972	1989				
38023										
38024	1973	1989			1973	1989			1973	1976
38025										
38026	1974	1989			1974	1989				
38027										
38028										
38029	1978	1989								

STN NO	RIVER	STATION	G1	SYR1	G2	SYR2	G3	SYR3	CODE
38030	Beane	Hartham	AB	1979					
38815	Canons Brook	Canons Brook Weir		1970					C
38817	Stanstead Springs	Mountfichet 2		1970					C
38818	Rye Meads Outfall	Rye Meads STW							Z
39001	Thames	Kingston	CC	1883	BC	1952	AC	1974	
39002	Thames	Days Weir	BB	1938	AB	1969			
39003	Wandle	Conollys Mill	BB	1962					
39004	Wandle	Beddington Park	CC	1936	BC	1985			
39005	Beverley Brook	Wimbledon Common	CB	1935	BB	1961			
39006	Windrush	Newbridge	BB	1950	AB	1969			
39007	Blackwater	Swallowfield	BC	1952	AC	1970			
39008	Thames	Eynsham	BC	1951					
39009	Thames	Bray Weir	CB	1959					
39010	Colne	Denham	AC	1952					
39011	Wey	Tilford	CA	1954	AA	1972			
39012	Hogsmill	Kingston	AC	1956					
39013	Colne	Berrygrove	BC	1934					
39014	Ver	Hansteads	BC	1956	AC	1969			
39015	Whitewater	Lodge Farm	BB	1963	AB	1975			
39016	Kennet	Theale	AA	1961					
39017	Ray	Grendon Underwood	AA	1962					
39019	Lambourn	Shaw	AB	1962					
39020	Coln	Bibury	AB	1963					
39021	Cherwell	Enslow Mill	AB	1965					
39022	Loddon	Sheepbridge	AA	1965					
39023	Wye	Hedsor Mill	AB	1964					
39024	Gatwick Stream	Gatwick	BC	1952					
39025	Enbourne	Brimpton	AC	1967					
39026	Cherwell	Banbury	BC	1969					
39027	Pang	Pangbourne	AC	1968					
39028	Dun	Hungerford	AA	1968					
39029	Tillingbourne	Shalford	AA	1968					
39030	Gade	Croxley Green	AC	1970					
39031	Lambourn	Welford	BA	1962					
39032	Lambourn	East Shefford	BC	1966					
39033	Winterbourne Stream	Bagnor	BB	1962	AB	1968			
39034	Evenlode	Cassington Mill	AA	1970					
39035	Churn	Cerney Wick	BC	1969					
39036	Law Brook	Albury	BA	1968					
39037	Kennet	Marlborough	BC	1972					

STN NO	UP1SYR	UP1FYR	UP2SYR	UP2FYR	PP1SYR	PP1FYR	PP2SYR	PP2FYR	OMIT1	OMIT2
38030	1979	1989								
38815										
38817										
38818										
39001										
39002	1938	1989								
39003	1962	1989								
39004										
39005	1961	1989								
39006	1950	1989								
39007										
39008										
39009										
39010										
39011	1972	1989			1972	1989				
39012										
39013										
39014										
39015	1963	1989								
39016	1961	1989			1961	1989				
39017	1962	1989			1962	1989				
39019	1962	1989								
39020	1963	1989								
39021	1965	1989								
39022	1965	1989			1965	1989				
39023	1964	1989								
39024										
39025										
39026										
39027										
39028	1968	1989			1968	1989				
39029	1968	1989			1968	1989				
39030										
39031	1962	1983								
39032										
39033	1962	1989								
39034	1970	1989			1970	1989				
39035										
39036	1968	1989								
39037										

STN NO	RIVER	STATION	G1	SYR1	G2	SYR2	G3	SYR3	CODE
39038	Thame	Shabbington	BC	1968					
39040	Thames	West Mill, Cricklade	AC	1972					
39042	Leach	Priory Mill, Lechlade	AA	1972					
39043	Kennet	Knighton	BA	1962					
39044	Hart	Bramshill House	AC	1972					
39046	Thames	Sutton Courtenay	AB	1973					
39049	Silk Stream	Colindeep Lane	AB	1973					
39051	Sor Brook	Adderbury	BA	1967					
39052	The Cut	Pitts Weir, Binfield	BC	1957					
39053	Mole	Horley	AC	1961					
39054	Mole	Gatwick Airport	AA	1961					
39055	Yeading Brook West	Yeading West	CB	1979					
39056	Ravensbourne	Catford Hill	AB	1977					
39057	Crane	Cranford Park	BB	1978					
39058	Pool	Winsford Road	AB	1978					
39061	Letcombe Brook	Letcombe Bassett	AB	1971	AC	1988			
39065	Ewelme Brook	Ewelme	AA	1970					
39068	Mole	Castle Mill	CB	1971	AB	1978			
39069	Mole	Kinnersley Manor	AC	1972					
39071	Thames	Ewen	CC	1979					
39072	Thames	Royal Windsor Park	AA	1979					
39073	Churn	Cirencester	AC	1979					
39074	Ampney Brook	Sheepen Bridge	BC	1980					
39075	Marston Meysey Brk	Whetstone Bridge	AC	1980					
39076	Windrush	Worsham	BA	1976					
39077	Og	Marlborough Poulton Fm	AC	1980					
39078	Wey (North)	Farnham	BB	1978					
39079	Wey	Weybridge	AA	1979					
39081	Ock	Allot Gardens	AB	1962					
39085	Wandle	Wandle Park	UU	1936					
39086	Gatwick Stream	Gatwick Link	AC	1975					
39087	Ray	Water Eaton	BC	1974					
39088	Chess	Rickmansworth	AB	1974					
39089	Gade	Bury Mill	BA	1975					
39090	Cole	Inglesham	AA	1985					
39091	Misbourne	Quarrendon Mill	BC	1978					
39092	Dollis Brook	Hendon Lane Bridge	BC	1979					
39093	Brent	Monks Park	BB	1978					
39094	Crane	Marsh Farm	CC	1977					
39095	Quaggy	Manor House Gardens	BB	1978					

STN NO	UP1SYR	UP1FYR	UP2SYR	UP2FYR	PP1SYR	PP1FYR	PP2SYR	PP2FYR	OMIT1	OMIT2
39038										
39040										
39042	1972	1989			1972	1989				
39043	1962	1989								
39044										
39046	1973	1989							1975	1976
39049	1973	1989								
39051	1967	1988								
39052										
39053										
39054	1961	1989			1961	1989			1984	
39055										
39056	1977	1989								
39057	1978	1989								
39058	1978	1989								
39061	1971	1987							1971	1976
39065	1970	1989			1970	1989			1973	1974
39068	1978	1989								
39069										
39071										
39072	1979	1989			1979	1989				
39073										
39074										
39075										
39076	1976	1989								
39077										
39078	1978	1989								
39079	1979	1989			1979	1989				
39081	1962	1989								
39085										
39086										
39087										
39088	1974	1989								
39089	1975	1989								
39090	1985	1985			1985	1985				
39091										
39092										
39093	1978	1989								
39094										
39095	1978	1989								

STN NO	RIVER	STATION	G1	SYR1	G2	SYR2	G3	SYR3	CODE
39096	Wealdstone Brook	Wembley	AB	1979					
39097	Thames	Buscot	BB	1980					
39098	Pinn	Uxbridge	AA	1984					
39099	Ampney Brook	Ampney St. Peter	AC	1983					
39100	Swill Brook	Oaksey	BC	1984					
39101	Aldbourne	Ramsbury	AA	1982					
39102	Misbourne	Denham	AB	1984					
39809	Bear Brook	Aylesbury	CB	1969					
39836	Duke of N St	Mogden Lower Dukes	BC	1977					
40001	Medway	Weir Wood Reservoir	AC	1953					
40002	Darwell	Darwell Reservoir	AC	1956					
40003	Medway	Teston	CB	1956	CC	1971			
40004	Rother	Udiam	AC	1962					
40005	Beult	Stile Bridge	AC	1958					
40006	Bourne	Hadlow	AA	1959					
40007	Medway	Chafford Weir	AA	1960					
40008	Great Stour	Wye	AB	1962					
40009	Teise	Stone Bridge	AC	1961					
40010	Eden	Penshurst	AC	1961					
40011	Great Stour	Horton	AA	1964					
40012	Darent	Hawley	BC	1963					
40013	Darent	Otford	AC	1969					
40014	Wingham	Durlock	AC	1971					
40015	White Drain	Fairbrook Farm	AC	1969					
40016	Cray	Crayford	AC	1969					
40017	Dudwell	Burwash	BA	1971					
40018	Darent	Lullingstone	BC	1968					
40020	Eridge Stream	Hendal Bridge	AA	1973					
40021	Hexden Channel	Hopemill Br Sandhurst	AA	1975					
40022	Great Stour	Chart Leacon							Z
40023	East Stour	South Willesborough	CC	1976	AC	1979			
40024	Bartley Mill Stream	Bartley Mill	AA	1974					
40822	Eden	Vexour Bridge		1977					Z
41001	Nunningham Stream	Tilley Bridge	BA	1950					
41002	Ash Bourne	Hammer Wood Bridge	AB	1951					
41003	Cuckmere	Sherman Bridge	AA	1959	AC	1970			
41004	Ouse	Barcombe Mills	CA	1956	CB	1978			
41005	Ouse	Gold Bridge	AA	1960	AC	1978			
41006	Uck	Isfield	AA	1964					
41009	Rother	Hardham	BA	1959	AA	1982			

STN NO	UP1SYR	UP1FYR	UP2SYR	UP2FYR	PP1SYR	PP1FYR	PP2SYR	PP2FYR	OMIT1	OMIT2
39096	1979	1989								
39097	1980	1989								
39098	1984	1989			1984	1989				
39099										
39100										
39101	1982	1989			1982	1989				
39102	1984	1989								
39809										
39836										
40001										
40002										
40003										
40004										
40005										
40006	1959	1989			1959	1989				
40007	1960	1989			1960	1989				
40008	1962	1989								
40009										
40010										
40011	1964	1989			1964	1989				
40012										
40013										
40014										
40015										
40016										
40017	1971	1989								
40018										
40020	1973	1989			1973	1989				
40021	1975	1984			1975	1984			1975	1979
40022										
40023										
40024	1974	1981			1974	1981				
40822										
41001	1950	1989								
41002	1951	1989								
41003	1959	1969			1959	1969				
41004										
41005	1960	1977			1960	1977				
41006	1964	1989			1964	1989				
41009	1959	1976								

STN NO	RIVER	STATION	G1	SYR1	G2	SYR2	G3	SYR3	CODE
41010	Adur West Branch	Hatterell Bridge	AA	1961					
41011	Rother	Iping Mill	AA	1966					
41012	Adur East Branch	Sakeham	AB	1967					
41013	Huggletts Stream	Henley Bridge	AA	1950					
41014	Arun	Pallingham Quay	AB	1970					
41015	Ems	Westbourne	AC	1967					
41016	Cuckmere	Cowbeech	BB	1939					
41017	Combehaven	Crowhurst	BB	1969					
41018	Kird	Tanyards	BC	1969					
41019	Arun	Alfoldean	AC	1970					
41020	Bevern Stream	Clappers Bridge	BA	1969					
41021	Clayhill Stream	Old Ship	AC	1969					
41022	Lod	Halfway Bridge	BA	1970					
41023	Lavant	Graylingwell	AC	1970					
41024	Shell Brook	Shell Brook P. Stn	BB	1971	BC	1978			
41025	Lockwood Stream	Drungewick	AA	1971					
41026	Cockhaise Brook	Holywell	AA	1971					
41027	Rother	Princes Marsh	AB	1972					
41028	Chess Stream	Chess Bridge	AA	1964					
41029	Bull	Lealands	AA	1983					
41030	Ouse	Ardingly							Z
41806	North End Stream	Allington	AA	1977					
41807	Bevern Stream	East Chiltington	AA	1972					
42001	Wallington	North Fareham	AB	1951					
42003	Lymington	Brockenhurst Park	AA	1960					
42004	Test	Broadlands	CA	1957					
42005	Wallop Brook	Broughton	BC	1955					
42006	Meon	Mislingford	AB	1958					
42007	Alre	Drove Lane Alresford	AA	1970					
42008	Cheriton Stream	Sewards Bridge	AC	1970					
42009	Condover Stream	Borough Bridge	AB	1970					
42010	Itchen	Highbridge + Allbrook	AA	1958					
42011	Hamble	Frog Mill	AB	1972					
42012	Anton	Fullerton	AA	1975					
42013	Test	Longbridge		1981					C
42014	Blackwater	Ower	AA	1976					
42015	Dever	Weston Colley	AB	1988					
42016	Itchen	Easton	BB	1975					
42018	Monks Brook	Eastleigh	BA	1977	AA	1986			
42019	Tanners Brook	Millbrook	BA	1977					

STN NO	UP1SYR	UP1FYR	UP2SYR	UP2FYR	PP1SYR	PP1FYR	PP2SYR	PP2FYR	OMIT1	OMIT2
41010	1961	1989			1961	1989			1978	1983
41011	1966	1989			1966	1989				
41012	1967	1989								
41013	1950	1989			1950	1989				
41014	1970	1989								
41015										
41016	1939	1989								
41017	1969	1989								
41018										
41019										
41020	1969	1989								
41021										
41022	1970	1989								
41023										
41024	1971	1977								
41025	1971	1989			1971	1989				
41026	1971	1989			1971	1989				
41027	1972	1989								
41028	1964	1989			1964	1989			1983	1984
41029	1983	1989			1983	1989			1986	
41030										
41806	1977	1979			1977	1979				
41807	1972	1974			1972	1974				
42001	1951	1989							1976	
42003	1960	1989			1960	1989				
42004										
42005										
42006	1958	1989								
42007	1970	1989			1970	1989				
42008										
42009	1970	1989								
42010	1958	1989			1958	1989				
42011	1972	1989								
42012	1975	1989			1975	1989				
42013										
42014	1976	1989			1976	1989				
42015	1988	1989								
42016	1975	1983								
42018	1988	1989			1988	1989				
42019	1977	1989								

STN NO	RIVER	STATION	G1	SYR1	G2	SYR2	G3	SYR3	CODE
42020	Tadburn Lake	Romsey	BA	1988					
42021	Branch of Test	Nursling		1979					C
42813	Itchen	Allbrook		1975					C
43001	Avon	Ringwood	CA	1960					
43002	Stour	Ensbury							Z
43003	Avon	East Mill	BA	1965					
43004	Bourne	Laverstock Mill	AB	1965					
43005	Avon	Amesbury	AA	1965					
43006	Nadder	Wilton Park	BA	1966	CA	1984			
43007	Stour	Throop Mill	AB	1973					
43008	Wylye	South Newton	AA	1967					
43009	Stour	Hammoon	CB	1968					
43010	Allen	Loverly Mill	AC	1970					
43011	Ebble	Bodenham	AA	1970					
43012	Wylye	Norton Bavant	AB	1971					
43013	Mude	Somerford	CC	1971					
43014	East Avon	Upavon	AA	1971					
43015	Wylye	Longbridge Deverill							Z
43017	West Avon	Upavon	AB	1971					
43018	Allen	Walford Mill	BC	1974					
43019	Shreen Water	Colesbrook	AB	1973					
43021	Avon	Knapp Mill	CB	1975	BB	1984			
43805	Avon	Upavon							Z
43811	Avon	East Mills Weir	CC	1965					
44001	Frome	East Stoke (total)	BB	1966					
44002	Piddle	Baggs Mill	AA	1963					
44003	Asker	Bridport	AA	1966					
44004	Frome	Dorchester (total)	BA	1971					
44006	Sydling Water	Sydling St. Nicholas	AA	1969					
44008	South Winterbourne	W'bourne Steepleton	BC	1974					
44009	Wey	Broadwey	BA	1975					
44010	Asker	St. Andrews Road							Z
44811	Frome	East Stoke Weir	AC	1965					C
44812	Asker	Flood Relief Weir							Z
44813	Frome	Stinsford	AC	1971					C
45001	Exe	Thorverton	AA	1956	AC	1979			
45002	Exe	Stoodleigh	AA	1961	AC	1979			
45003	Culm	Woodmill	BA	1962	AA	1972			
45004	Axe	Whitford	BA	1964					
45005	Otter	Dotton Bridge	AB	1963					

STN NO	UP1SYR	UP1FYR	UP2SYR	UP2FYR	PP1SYR	PP1FYR	PP2SYR	PP2FYR	OMIT1	OMIT2
42020	1988	1989								
42021										
42813										
43001										
43002										
43003	1965	1985								
43004	1965	1989							1973	1989
43005	1965	1989			1965	1989			1976	
43006	1966	1983								
43007	1973	1989								
43008	1967	1989			1967	1989				
43009										
43010										
43011	1970	1976			1970	1976				
43012	1971	1989								
43013										
43014	1971	1989			1971	1989				
43015										
43017	1971	1989								
43018										
43019	1973	1989								
43021	1984	1989								
43805										
43811										
44001	1966	1985								
44002	1963	1989			1963	1989				
44003	1966	1980			1966	1980			1966	
44004	1971	1985								
44006	1969	1989			1969	1989				
44008										
44009	1975	1989								
44010										
44811										
44812										
44813										
45001	1956	1978			1956	1978				
45002	1961	1978			1961	1978				
45003	1962	1989			1972	1989				
45004	1964	1989								
45005	1963	1989								

STN NO	RIVER	STATION	G1	SYR1	G2	SYR2	G3	SYR3	CODE
45006	Quarme	Enterwell	CA	1964					
45008	Otter	Fenny Bridges	BA	1974					
45009	Exe	Pixton	BC	1981					
45010	Haddeo	Hartford	BA	1973	BC	1979			
45011	Barle	Brushford	BA	1968					
45012	Creedy	Cowley	BA	1964					
45801	Back Brook	Hawkerland							Z
45825	Spring	Allerbeare		1970					S
45826	Spring	Blindmore		1969					S
45827	Spring	Sallicombe		1969					S
45828	Spring	Sandy's Farm		1969					S
45829	Tale	Fairmile	BA	1978					
	Haddeo	Wimbleball	AC						Z
46001	South Teign	Fernworthy Reservoir							Z
46002	Teign	Preston	BA	1956					
46003	Dart	Austins Bridge	BA	1958					
46004	Avon	Avons Res.							Z
46005	East Dart	Bellever Bridge	AA	1964					
46006	Erme	Ermington	BB	1974	AB	1977			
46007	West Dart	Dunnabridge	AC	1972					
46008	Avon	Loddiswell	BB	1971	AB	1975			
46802	Swincombe	Swincombe Intake	AC	1934					
46812	Hems	Tally Ho!	BA	1976					
46818	Hems	Woodlands	BA		AA	1977			
47001	Tamar	Gunnislake	BA	1956					
47002	Tamar	Werrington	CB	1956					
47003	Tavy	Lopwell	CC	1957					
47004	Lynher	Pillaton Mill	BB	1963					
47005	Ottery	Werrington Park	CA	1963	AA	1978			
47006	Lyd	Lifton	BA	1963	AA	1968			
47007	Yealm	Puslinch	BB	1963	AB	1967			
47008	Thrushel	Tinhay	AA	1969					
47009	Tiddy	Tideford	AA	1969					
47010	Tamar	Crowford Bridge	AC	1972					
47011	Plym	Carnwood	AC	1971					
47013	Withey Brook	Bastreet	AC	1973					
47014	Walkham	Horrabridge	AA	1981					
47015	Tavy	Denham-Ludbrook	BC		AC	1981			
47016	Lumburn	Lumburn Bridge	BA	1976					
47017	Wolf	Coombe Park Farm	AA	1977					

STN NO	UP1SYR	UP1FYR	UP2SYR	UP2FYR	PP1SYR	PP1FYR	PP2SYR	PP2FYR	OMIT1	OMIT2
45006										
45008	1974	1989								
45009										
45010	1973	1978								
45011	1968	1981								
45012	1964	1987								
45801										
45825					1970	1979				
45826					1969	1979				
45827					1969	1979				
45828										
45829	1978	1987								
46001										
46002	1956	1989								
46003	1958	1989								
46004										
46005	1964	1989			1964	1989				
46006	1974	1989								
46007										
46008	1971	1981								
46802										
46812	1976	1987								
46818	1977	1987			1977	1987				
47001	1956	1989								
47002										
47003										
47004	1963	1989								
47005	1978	1981			1978	1981				
47006	1963	1981			1968	1981				
47007	1963	1989								
47008	1969	1989			1969	1989				
47009	1969	1989			1969	1989				
47010										
47011										
47013										
47014	1981	1989			1981	1989				
47015										
47016	1976	1987							1980	
47017	1977	1986			1977	1986			1977	

STN NO	RIVER	STATION	G1	SYR1	G2	SYR2	G3	SYR3	CODE
	Thrushel	Hayne Bridge							Z
	Inney	Beals Mill	CA						Z
	Tory Brook	Newnham Park	CC						Z
	Tamar	Polson Bridge							Z
48001	Fowey	Trekeivesteps	CC	1957	AC	1968			
48002	Fowey	Restormel One	AC	1961					
48003	Fal	Tregorny	AB	1978					
48004	Warleggan	Trengoffe	AA	1969					
48005	Kenwyn	Truro	AA	1968					
48006	Cober	Helston	BA	1968	BC	1981			
48007	Kennall	Ponsanooth	AC	1968					
48008	Molingley	St. Austell							Z
48009	St. Neot	Craigshill Wood	AA	1971	AC	1983			
48010	Seaton	Trebrownbridge	AA	1957					
48011	Fowey	Restormel Two	AC	1961					
48811	St. Neot	Collingford Weir (L)	AC						Z
48812	St. Neot	East Colliford (U)		1977					C
	Sibley Back	Sibley Back	AC						Z
	Cobar	Trenear, Wendron	CC						Z
49001	Camel	Denby	BA	1964	AA	1984			
49002	Hayle	St. Erth	AB	1957					
49003	De Lank	De Lank	AC	1967					
49004	Gannel	Gwills	AB	1969					
50001	Taw	Umberleigh	BC	1958					
50002	Torridge	Torrington	BA	1962	BB	1982			
50003	Taw	Sticklepath	CC	1980					
50004	Hole Water	Muxworthy							Z
50005	West Okemont	Vellake	AC	1975					
50006	Mole	Woodleigh	BC	1965					
50007	Taw	Taw Bridge	BB	1973					
50807	Okemont	Jacobstown	BB	1973					
50809	Yeo	Veraby	BA	1968	BC	1983			
50821	Bray	Leehamford Br.	BC						Z
	Lew	Gribbleford							Z
	Okemont	Iddesleigh							Z
	West Okemont	Meldon	AC						Z
	North Lew	Norley Bridge							Z
	Yeo	Parkham							Z
	Yeo	Yeotown							Z
	Torridge	Rockhay							Z

STN NO	UP1SYR	UP1FYR	UP2SYR	UP2FYR	PP1SYR	PP1FYR	PP2SYR	PP2FYR	OMIT1	OMIT2
48001										
48002										
48003	1978	1989								
48004	1969	1989			1969	1989				
48005	1968	1989			1968	1989				
48006	1968	1980								
48007										
48008										
48009	1971	1980			1971	1980				
48010	1957	1989			1957	1989				
48011										
48811										
48812										
49001	1964	1989			1984	1989			1969	
49002	1957	1989								
49003										
49004	1969	1989								
50001										
50002	1962	1989								
50003										
50004										
50005										
50006										
50007	1973	1987								
50807	1973	1974								
50809	1968	1981								
50821										

STN NO	RIVER	STATION	G1	SYR1	G2	SYR2	G3	SYR3	CODE
51001	Doniford Stream	Swill Bridge	AA	1967					
51002	Horner Water	West Luccombe	AC	1973					
51003	Washford	Beggearn Huish	BA	1966	AA	1982			
51802	Washford	Lower Washford							Z
52001	Axe	Wookey	BC	1956					
52002	Yeo	Sutton Bingham Res.	CC	1956					
52003	Halse Water	Bishops Hull	AA	1961					
52004	Isle	Ashford Mill	AA	1962					
52005	Tone	Bishops Hull	CB	1961	AB	1968			P
52006	Yeo	Pen Mill	AC	1963					
52007	Parrett	Chiselborough	AA	1966					
52008	Tone	Clatworthy Reservoir	AC	1960					
52009	Sheppey	Fenny Castle	AA	1964					
52010	Brue	Lovington	AA	1964					
52011	Cary	Somerton	BA	1965	AA	1979			
52014	Tone	Greenham	AC	1967					
52015	Land Yeo	Wraxhall Bridge	AB	1971					
52016	Currypool Stream	Currypool Farm	AA	1971					
52017	Congresbury Yeo	Iwood	BC	1973					
52018	Sowy	Monks Lease Clyse							Z
52019	Kings Sedgemoor	Dunball Clyse							Z
52020	Gallica Stream	Gallica Bridge	AA	1966					
52021	Yeo	Sherborne							Z
52022	Tone	Gardeners Bridge							Z
52023	Parrett	Langport							Z
52024	Tone	Taunton							Z
52801	Tone	Wadhams Farm							Z
52813	Tone	Taunton		1961					S
52814	Parrett	Langport		1963					S
52815	Tone	Fosters		1961					S
52816	Parrett	Bridgwater		1971					S
53001	Avon	Melksham	CC	1953					
53002	Semington Brook	Semington	CA	1953	AA	1970			
53003	Avon	Bath St. James	CC	1939					
53004	Chew	Compton Dando	AC	1958					
53005	Midford Brook	Midford	AA	1961					
53006	Frome (Bristol)	Frenchay	AA	1961					
53007	Frome (Somerset)	Tellisford	AA	1961					
53008	Avon	Great Somerford	AA	1964	AC	1977			
53009	Wellow Brook	Wellow	AA	1966					

STN NO	UP1SYR	UP1FYR	UP2SYR	UP2FYR	PP1SYR	PP1FYR	PP2SYR	PP2FYR	OMIT1	OMIT2
51001	1967	1989			1967	1989				
51002										
51003	1966	1989			1982	1989				
51802										
52001										
52002										
52003	1961	1989			1961	1989				
52004	1962	1989			1962	1989				
52005										
52006										
52007	1966	1989			1966	1989				
52008										
52009	1964	1989			1964	1989				
52010	1964	1989			1964	1989				
52011	1965	1989			1979	1989				
52014										
52015	1971	1989							1976	
52016	1971	1989			1971	1989				
52017										
52018										
52019										
52020	1966	1978			1966	1978				
52021										
52022										
52023										
52024										
52801										
52813										
52814										
52815										
52816										
53001										
53002	1970	1989			1970	1989				
53003										
53004										
53005	1961	1989			1961	1989				
53006	1961	1989			1961	1989				
53007	1961	1989			1961	1989				
53008	1964	1976			1964	1976				
53009	1966	1989			1966	1989				

STN NO	RIVER	STATION	G1	SYR1	G2	SYR2	G3	SYR3	CODE
53013	Marden	Stanley	AA	1970					
53014	Spring Flow	Three Ashes							Z
53015	Spring Flow	Tiswell	UU	1973					P
53016	Spring Flow	Dunkerton	UU	1973					P
53017	Boyd	Bitton	AA	1973					
53018	Avon	Bathford	AB	1969	AC	1977			
53019	Woodbridge Brook	Crab Mill	BB	1969					
53020	Gauze Brook	Rodbourne	CC	1968					
53021	The Malago	Bristol							Z
53022	Avon	Bath Ultrasonic	AC	1976					
53023	Sherston Avon	Fosseway	AC	1976					
53024	Tetbury Avon	Brokenborough	AC	1978					
53025	Mells	Vallis	AA	1980					
53026	Frome (Bristol)	Frampton Cotterell	AA	1978					
53028	By Brook	Middlehill	BA	1982					P
53029	Biss	Trowbridge	AA	1984					
53810	Rickford Spring	Rickford	UU	1931					P
53811	Langford Spring	Langford	UU	1931					P
54001	Severn	Bewdley	AC	1921					
54002	Avon	Evesham	BC	1936					
54003	Vyrnwy	Vyrnwy Reservoir	AC	1920					
54004	Sowe	Stoneleigh	AC	1952					
54005	Severn	Montford	BC	1953					
54006	Stour	Kidderminster	BC	1953					
54007	Arrow	Broom	BC	1957	AC	1976			
54008	Teme	Tenbury	BA	1956					
54010	Stour	Alscot Park	BA	1959	CA	1979			
54011	Salwarpe	Harford Hill	CB	1961					
54012	Tern	Walcot	CB	1960	AB	1978			
54013	Clywedog	Cribynau	BC	1959					
54014	Severn	Abermule	BA	1962	BC	1968			
54015	Bow Brook	Besford Bridge	BC	1969					
54016	Roden	Rodington	AB	1961					
54017	Leadon	Wedderburn Bridge	BB	1962					
54018	Rea Brook	Hookagate	AA	1962					
54019	Avon	Stareton	AB	1962					
54020	Perry	Yeaton	AB	1963					
54022	Severn	Plynlimon Flume	AA	1953					
54023	Badsey Brook	Offenham	BC	1968					
54024	Worfe	Burcote	AC	1969					

STN NO	UP1SYR	UP1FYR	UP2SYR	UP2FYR	PP1SYR	PP1FYR	PP2SYR	PP2FYR	OMIT1	OMIT2
53013	1970	1989			1970	1989				
53014										
53015										
53016										
53017	1973	1989			1973	1989				
53018	1969	1976								
53019	1969	1989								
53020										
53021										
53022										
53023										
53024										
53025	1980	1989			1980	1989				
53026	1978	1989			1978	1989				
53028										
53029	1984	1989			1984	1989				
53810										
53811										
54001										
54002										
54003										
54004										
54005										
54006										
54007										
54008	1956	1989								
54010	1959	1978								
54011										
54012	1978	1989								
54013										
54014	1962	1967								
54015										
54016	1961	1989								
54017	1962	1983								
54018	1962	1989			1962	1989				
54019	1962	1989								
54020	1963	1989								
54022	1953	1989			1953	1989			1989	
54023										
54024										

STN NO	RIVER	STATION	G1	SYR1	G2	SYR2	G3	SYR3	CODE
54025	Dulas	Rhos-Y-Pentref	AA	1969					
54026	Chelt	Slate Mill	BC	1969					
54027	Frome	Ebley Mill	BB	1969					
54028	Vyrnwy	Llanymynech	BC	1970					
54029	Teme	Knightsford Bridge	BA	1970					
54032	Severn	Saxons Lode	BC	1970	AC	1986			
54034	Dowles Brook	Dowles	AA	1971					
54036	Isbourne	Hinton-on-the-Green	BB	1972					
54038	Tanat	Llanyblodwel	BA	1973					
54040	Meese	Tibberton	AB	1973					
54041	Tern	Eaton-on-Tern	AB	1972					
54042	Clywedog	Clywedog Dam	BC	1971					
54043	Severn	Upton-on-Severn	CC	1955					
54044	Tern	Ternhill	AC	1972					
54045	Perry	Perry Farm	CA	1974					
54046	Worfe	Cosford	BC	1975					
54047	Perry	Ruyton Bridge	BC	1975					
54048	Dene	Wellesbourne	AB	1976					
54049	Leam	Princes Drive Weir	BC	1979					
54050	Leam	Eathorp							Z
54051	Clywedog	Upper Stilling Poll							Z
54052	Bailey Brook	Ternhill	AB	1970					
54053	Corve	Ludlow	BA	1972	CA	1981			
54054	Onny	Onibury	BA	1972					
54055	Rea	Nean Sollars	CA	1972					
54056	Clun	Clungunford	CA						Z
54057	Severn	Haw Bridge	BC	1971					
54058	Stoke Park Brook	Stoke Park	BC	1972					
54059	Allford Brook	Allford	BC	1972					
54060	Potford Brook	Potford	BC	1972					
54061	Hodnet Brook	Hodnet	BC	1972					
54062	Stoke Brook	Stoke	BC	1972					
54063	Stour	Prestwood Hospital	BC	1972					
54065	Roden	Stanton	BB	1973					
54066	Platt Brook	Platt	BC	1973					
54067	Smestow Brook	Swindon	CC	1974					
54068	Tetchill Brook	Hordley	BC	1974					
54069	Springs Brook	Lower Hordleyn	BC	1974					
54070	War Brook	Walford	BC	1974					
54080	Severn	Dolwen	BC	1977					

STN NO	UP1SYR	UP1FYR	UP2SYR	UP2FYR	PP1SYR	PP1FYR	PP2SYR	PP2FYR	OMIT1	OMIT2
54025	1969	1989			1969	1989				
54026										
54027	1969	1984								
54028										
54029	1970	1989								
54032										
54034	1971	1989			1971	1989				
54036	1972	1984								
54038	1973	1989								
54040	1973	1989								
54041	1972	1989								
54042										
54043										
54044										
54045										
54046										
54047										
54048	1976	1984								
54049										
54050										
54051										
54052	1970	1987								
54053	1972	1976								
54054	1972	1976								
54055										
54056										
54057										
54058										
54059										
54060										
54061										
54062										
54063										
54065	1973	1979								
54066										
54067										
54068										
54069										
54070										
54080										

STN NO	RIVER	STATION	G1	SYR1	G2	SYR2	G3	SYR3	CODE
54081	Clywedog	Bryntail	AC	1977					
54083	Crow Brook	Horton	AC	1978					
54084	Cannop Brook	Parkend	BA	1978					
54085	Cannop Brook	Cannop Cross	BA	1979					
54086	Cownwy Diversion	Cownwy Weir	AC	1979					
54087	Allford Brook	Childs Ercall	AB	1973					
54088	Little Avon	Berkeley Kennels	AB	1978					
54089	Avon	Bredon	BC						Z
54090	Tanllwyth	Tanllwyth Flume	AA	1973					
54091	Severn	Hafren Flume	AA	1976					
54092	Hore	Hore Flume	AA	1973					
54094	Strine	Crudgington	BB	1982					
54095	Severn	Buildwas	AC	1984					
54096	Hadley Brook	Wards Bridge	A						Z
54811	Little Avon	Wickwar							Z
54813	Little Avon	Damery							Z
54818	Roden	Northwood	CB	1970					
54819	Roden	Aston	UU	1970					
54820	Sleap Brook	Ruewood	UU	1970					
54821	Heath Brook	Heath	BC	1972					
54822	Allford Brook	Allford Upper	BC						Z
54880	Severn	Llanidloes							Z
54881	Severn	Bewdley Recorder		1974					C
54885	Severn	The Mythe (Tewkesbury)							Z
54887	Teme	Leintwardine	CA						Z
	Potford Brook	Sandyford Bridge	AB						Z
55002	Wye	Belmont	CA		AB	1932	AC	1985	
55003	Lugg	Lugwardine	AA	1939					
55004	Irfon	Abernant	AA	1937					
55005	Wye	Rhayader	AA	1937					
55006	Elan	Caban Coch Reservoir	AC	1908					
55007	Wye	Erwood	AB	1937	AC	1985			
55008	Wye	Cefn Brwyn	AA	1951					
55009	Monnow	Kentchurch	AC	1948	AA	1967			
55010	Wye	Pant Mawr	AA	1955					
55011	Ithon	Llandewi	BA	1959					
55012	Irfon	Cilmery	AA	1966					
55013	Arrow	Titley Mill	AA	1966					
55014	Lugg	Byton	AA	1966					
55015	Honddu	Tafolog	CA	1966					

STN NO	UP1SYR	UP1FYR	UP2SYR	UP2FYR	PP1SYR	PP1FYR	PP2SYR	PP2FYR	OMIT1	OMIT2
54081										
54083										
54084	1978	1983								
54085	1979	1983								
54086										
54087	1973	1983							1973	
54088	1978	1989								
54089										
54090	1973	1988			1973	1988				
54091	1976	1988			1976	1988				
54092	1973	1988			1973	1988				
54094	1982	1989								
54095										
54096										
54811										
54813										
54818										
54819										
54820										
54821										
54822										
54880										
54881										
54885										
54887										
55002	1935	1984								
55003	1939	1981			1939	1981				
55004	1937	1982			1937	1982				
55005	1937	1969			1937	1969				
55006										
55007	1937	1984								
55008	1951	1988			1951	1988				
55009	1967	1972			1967	1972				
55010	1955	1982			1955	1982				
55011	1959	1982								
55012	1966	1989			1966	1989				
55013	1966	1989			1966	1989				
55014	1966	1989			1966	1989				
55015										

STN NO	RIVER	STATION	G1	SYR1	G2	SYR2	G3	SYR3	CODE
55016	Ithon	Disserth	BA	1968	AA	1972			
55017	Chwefru	Carreg-y-wen	CA	1968	AA	1974			
55018	Frome	Yarkhill	BB	1968					
55019	Gamber Brook	Kilbreece							Z
55020	Pinsley Brook	Cholstrey Mill							Z
55021	Lugg	Butts Bridge	AA	1969					
55022	Trothy	Mitchel Troy	AA	1969					
55023	Wye	Redbrook	BA	1936	BC	1984			
55025	Llynfi	Three Cocks	AA	1970					
55026	Wye	Ddol Farm	AA	1937					
55027	Rudhall Brook	Sandford Bridge	BC	1971					
55028	Frome	Bishops Frome	AA	1971					
55029	Monnow	Grosmont	AA	1948					
55030	Claerwen	Dol-y-mynach	AC	1926					
55031	Yazor Brook	Three Elms	BA	1973					
55032	Elan	Elan Village	AC	1908					!
55033	Wye	Gwy Flume	AA	1969					
55034	Cyff	Cyff Flume	AA	1973					
55035	Iago	Iago Flume	AA	1973					
56001	Usk	Chain Bridge	AA	1957	AC	1970			
56002	Ebbw	Rhiwderyn	BB	1957	AB	1976			
56003	Honddu	The Forge, Brecon	AA	1963					
56004	Usk	Llandetty	AA	1965	AC	1970			
56005	Lwyd	Ponthir	BA	1966					
56006	Usk	Trallong	AA	1963	AC	1970			
56007	Senni	Pont Hen Hafod	CA	1967	BA	1972			
56008	Monks Ditch	Llanwern	BA	1970					
56010	Usk	Trostrey Weir	AC	1969					
56011	Sirhowy	Wattsville	BC	1970					
56012	Grwyne	Millbrook	AA	1971					
56013	Yscir	Pontaryscir	AA	1972					
56014	Usk	Usk Reservoir	AC	1970					
56015	Olway Brook	Olway Inn	AA	1975					
56016	Caernafell O/F	Talybont Resevoir	AC	1979					
56017	Afon Lwyd	Pontnewydd	BA	1979					
56018	Sirhowy	Shon Sheffrey	AC	1980					
57001	Taf Fechan	Taf Fechan Reservoir	AC	1936					
57002	Taf Fawr	Llwynon Reservoir	AC	1931					
57003	Taff	Tongwynlais	AC	1965					
57004	Cynon	Abercynon	AB	1957					

STN NO	UP1SYR	UP1FYR	UP2SYR	UP2FYR	PP1SYR	PP1FYR	PP2SYR	PP2FYR	OMIT1	OMIT2
55016	1968	1989			1972	1989				
55017	1974	1981			1974	1981				
55018	1968	1989								
55019										
55020										
55021	1969	1989			1969	1989				
55022	1969	1982			1969	1982				
55023	1936	1983								
55025	1970	1989			1970	1989				
55026	1937	1989			1937	1989				
55027										
55028	1971	1989			1971	1989				
55029	1948	1989			1948	1989				
55030										
55031	1973	1989								
55032										
55033	1969	1988			1969.	1988				
55034	1973	1988			1973	1988				
55035	1973	1988			1973	1988				
56001	1957	1969			1957	1969				
56002	1957	1989								
56003	1963	1981			1963	1981				
56004	1965	1969			1965	1969				
56005	1966	1989								
56006	1963	1969			1963	1969				
56007	1972	1989								
56008	1970	1976								
56010										
56011										
56012	1971	1981			1971	1981				
56013	1972	1989			1972	1989				
56014										
56015	1975	1981			1975	1981				
56016										
56017	1979	1979								
56018										
57001										
57002										
57003										
57004	1957	1989								

STN NO	RIVER	STATION	G1	SYR1	G2	SYR2	G3	SYR3	CODE
57005	Taff	Pontypridd	AB	1970					
57006	Rhondda	Trehafod	AB	1970					
57007	Taff	Fiddlers Elbow	AB	1973					
57008	Rhymney	Llanedeyrn	AB	1973					
57009	Ely	St. Fagans	AB	1975					
57010	Ely	Lanelay	CB		BB	1974			
57011	Blaen Taf Fawr	Beacons Reservoir	AA	1976					
57012	Garwant	Llwynon Reservoir	AA	1976					
57014	Rhymney	Gilfach Bargoed	BC						Z
57015	Taff	Merthyr Tydfil	AB	1978					
57016	Taf Fechan	Pontsticill	AC	1979					
57803	Clun	Cross Inn							Z
58001	Ogmore	Bridgend	AA	1963					
58002	Neath	Resolven	CB	1975	AB	1978			
58003	Ewenny	Ewenny Priory	CA	1962					
58004	Afan	Cwmavon							Z
58005	Ogmore	Brynmenyn	AA	1970					
58006	Mellte	Pontneddfechan	AA	1971					
58007	Llynfi	Coytrahen	AC	1970					
58008	Dulais	Cilfrew	AA	1971					
58009	Ewenny	Keepers Lodge	AA	1971					
58010	Hepste	Esgair Carnau	AA	1975					
58011	Thaw	Gigman Bridge	BA	1976					
58012	Afan	Marcroft Weir							Z
59001	Tawe	Ynystanglws	BB	1957					
59002	Loughor	Tir-Y-Dail	BA	1967					
60002	Cothi	Felin Mynachdy	AA	1961					
60003	Taf	Clog-Y-Fran	BA	1965					
60004	Dewi Fawr	Glasfryn Ford	BA	1969					
60005	Bran	Llandovery	BA	1968					
60006	Gwili	Glangwili	AA	1968					
60007	Tywi	Dolau Hirion	AA	1968	AC	1972			
60008	Tywi	Ystradffin	AC	1983					
60009	Sawdde	Felin-Y-Cwm	AA	1970					
60010	Tywi	Nantgeredig	AA	1958	AC	1972			
60012	Twrch	Ddol Las	BA	1970					
60013	Cothi	Pont Ynys Brechfa	AA	1971					
60802	Towy	Llandilo Yr Ynys		1932					S
61001	Western Cleddau	Prendergast Mill	CA	1965					
61002	Eastern Cleddau	Canaston Bridge	BA	1960	AC	1972			

STN NO	UP1SYR	UP1FYR	UP2SYR	UP2FYR	PP1SYR	PP1FYR	PP2SYR	PP2FYR	OMIT1	OMIT2
57005	1970	1989								
57006	1970	1989								
57007	1973	1989								
57008	1973	1989								
57009	1975	1989								
57010	1974	1989								
57011	1976	1980			1976	1980				
57012	1976	1980			1976	1980				
57014										
57015	1978	1989								
57016										
57803										
58001	1963	1989			1963	1989				
58002	1978	1989								
58003										
58004										
58005	1970	1989			1970	1989				
58006	1971	1989			1971	1989				
58007										
58008	1971	1989			1971	1989				
58009	1971	1989			1971	1989				
58010	1975	1981			1975	1981				
58011	1976	1989								
58012										
59001	1957	1989								
59002	1967	1989								
60002	1961	1989			1961	1989				
60003	1965	1989								
60004	1969	1981								
60005	1968	1989								
60006	1968	1989			1968	1989				
60007	1968	1971			1968	1971				
60008										
60009	1970	1976			1970	1976				
60010	1958	1971			1958	1971				
60012	1970	1981								
60013	1971	1976			1971	1976			1975	1976
60802										
61001										
61002	1960	1971								

STN NO	RIVER	STATION	G1	SYR1	G2	SYR2	G3	SYR3	CODE
61003	Gwaun	Cilrhedyn Bridge	AA	1969					
61004	Western Cleddau	Redhill	CA	1965					
62001	Teifi	Glan Teifi	AA	1959					
62002	Teifi	Llanfair	AA	1971					
63001	Ystwyth	Pont Llolwyn	BA	1963					
63002	Rheidol	Llanbadarn Fawr	BC	1965					
63003	Wyre	Llanrhystyd	AA	1970	AC	1973			
63004	Ystwyth	Cwm Ystwyth	AA						Z
63005	Maesnant	Nant-Y-Moch C	AA	1984					
63006	Maesnant Fach	Nant-Y-Moch E	AA	1984					
64001	Dyfi	Dyfi Bridge	BA	1962					
64002	Dysynni	Pont-Y-Garth	AA	1966					
64003	Mawddach	Ganllwyd	CA	1967					
64004	Twymyn	Gemaes Road							Z
64005	Wnion	Dolgellau							Z
64006	Leri	Dolybont	AB	1960					
64007	Delyn	Llanbrynmair	AA	1983					
64008	Cwm	Llanbrynmair E	AA	1983					
65001	Glaslyn	Beddgelert	AB	1961					
65002	Dwyryd	Maentwrog	AC	1967					
65003	Gwyrfai	Llyn Gwellyn							Z
65004	Gwyrfai	Bontnewydd	AA	1970	AC	1976			
65005	Erch	Pontcaenewydd	AA	1973					
65006	Seiont	Peblig Mill	AB	1976					
65007	Dwyfawr	Garndolbenmaen	BA	1975	BB	1986			
65801	Afon Perris	Nant Perris	AA						Z
66001	Clwyd	Pont-Y-Cambwll	BB	1959	AB	1980			
66002	Elwy	Pant Yr Onen	BB	1961					
66003	Aled	Bryn Aled	BC	1963					
66004	Wheeler	Bodfari	AA	1970					
66005	Clwyd	Ruthin Weir	BA	1971					
66006	Elwy	Pont-Y-Gwyddel	AB	1973					
66008	Aled	Aled Isaf Reservoir	AC	1977					
66011	Conwy	Cwm Llanerch	AA	1964					
66012	Lledr	Gethins Bridge							Z
66802	Clwyd	Rhuddlan	CB	1961					
67001	Dee	Bala	AC	1957					
67002	Dee	Erbistock	BC	1937					
67003	Brenig	Llyn Brenig Outflow	AC	1922					
67005	Ceiriog	Brynkinalt weir	BA	1956					

STN NO	UP1SYR	UP1FYR	UP2SYR	UP2FYR	PP1SYR	PP1FYR	PP2SYR	PP2FYR	OMIT1	OMIT2
61003	1969	1989			1969	1989				
61004										
62001	1959	1989			1959	1989				
62002	1971	1981			1971	1981				
63001	1963	1989								
63002										
63003	1970	1972			1970	1972				
63004										
63005	1984	1988			1984	1988				
63006	1984	1988			1984	1988				
64001	1962	1989								
64002	1966	1989			1966	1989				
64003										
64004										
64005										
64006	1960	1989								
64007	1983	1989			1983	1989				
64008	1983	1989			1983	1989				
65001	1961	1989								
65002										
65003										
65004	1970	1975			1970	1975				
65005	1973	1989			1973	1989				
65006	1976	1989								
65007	1975	1989								
65801										
66001	1959	1980								
66002	1961	1974								
66003										
66004	1970	1976			1970	1976				
66005	1971	1976								
66006	1973	1989								
66008										
66011	1964	1989			1964	1989				
66012										
66802										
67001										
67002										
67003										
67005	1956	1976								

STN NO	RIVER	STATION	G1	SYR1	G2	SYR2	G3	SYR3	CODE
67006	Alwen	Druid	AC	1060					
67007	Dee	Glyndyfrdwy	BC	1964					
67008	Alyn	Pont-Y-Capel	AB	1965					
67009	Alyn	Rhydymwyn	AA	1965	AC	1968	AA	1975	
67010	Gelyn	Cynefail	AA	1966					
67011	Nant Aberderfel	Nant Aberderfel	CA	1967					
67012	Tryweryn	Upper Tryweryn							Z
67013	Hirnant	Plas Rhiwedog	AA	1967					
67014	Dee	Corwen							Z
67015	Dee	Manley Hall	AC	1937					
67016	Worthenbury Brook	Worthenbury	BB	1967					
67017	Tryweryn	Llyn Celyn Outflow	AC	1969					
67018	Dee	New Inn	BA	1969					
67019	Tryweryn	Weir X							Z
67020	Dee	Chester Weir							Z
67021	Aldford Brook	Lea Hall Farm							Z
67025	Clywedog	Bowling Bank	AC	1976					
67026	Dee	Eccleston Ferry	AC	1974					
67028	Ceidiog	Llandrillo	BC	1978					
67029	Trystion	Pen-Y-Felin Fawr	BC	1977					
67813	Dee	Farndon							Z
67814	Dee	Ironbridge							Z
68001	Weaver	Ashbrook	AB	1937					
68002	Gowy	Picton	CA	1949					
68003	Dane	Rudheath	CA	1949	AA	1978			
68004	Wistaston Brook	Marshfield Bridge	CA	1957	BA	1980			
68005	Weaver	Audlem	AA	1953					
68006	Dane	Hulme Walfield	CA	1953	AA	1978			
68007	Wincham Brook	Lostock Gralam	CA	1962	AA	1982			
68010	Fender	Ford	BA						Z
68011	Arley Brook	Gore Farm	AA	1975					
68015	Gowy	Huxley	CA		AA	1979			
68018	Dane	Congleton Park							Z
68019	Weaver	Pickerings Cut	CC						Z
68020	Gowy	Bridge Trafford	BA	1981					
69001	Mersey	Irlam Weir	CC	1934					
69002	Irwell	Adelphi Weir	BC	1949					
69003	Irk	Scotland Weir	BC	1937					
69004	Etherow	Bottoms Reservoir	AC	1945					
69005	Glaze Brook	Little Woolden Hall	CC	1954					

STN NO	UP1SYR	UP1FYR	UP2SYR	UP2FYR	PP1SYR	PP1FYR	PP2SYR	PP2FYR	OMIT1	OMIT2
67006										
67007										
67008	1965	1989								
67009	1965	1967	1975	1989	1965	1967	1975	1989		
67010	1966	1975			1966	1975				
67011										
67012										
67013	1967	1976			1967	1976				
67014										
67015										
67016	1967	1974								
67017										
67018	1969	1989								
67019										
67020										
67021										
67025										
67026										
67028										
67029										
67813										
67814										
68001	1937	1989								
68002										
68003	1978	1989			1978	1989				
68004	1980	1986								
68005	1953	1989			1953	1989				
68006	1978	1984			1978	1984				
68007	1982	1986			1982	1986				
68010										
68011	1975	1982			1975	1982				
68015	1981	1989			1981	1989				
68018										
68019										
68020	1981	1989								
69001										
69002										
69003										
69004										
69005										

STN NO	RIVER	STATION	G1	SYR1	G2	SYR2	G3	SYR3	CODE
69006	Bollin	Dunham Massey	CC	1955					
69007	Mersey	Ashton Weir	AC	1981					
69008	Dean	Stanneylands	AA	1984					
69011	Micker Brook	Cheadle	BA						Z
69012	Bollin	Wilmslow	AB	1985					
69013	Sinderland Brook	Partington	AB	1982					
69015	Etherow	Compstall	AC	1977					
69017	Goyt	Marple Bridge	AB	1977					
69018	Newton Brook	Newton Le Willows	AA						Z
69019	Worsley Brook	Eccles	CB	1969					
69020	Medlock	London Road	BB	1976					
69021	Stake Brook	Bacup	AA						Z
69023	Roch	Blackford Bridge	CC	1978					
69024	Croal	Farnworth Weir	CC	1981					
69027	Tame	Portwood	BC	1978					
69030	Sankey Brook	Causey Bridges	BC	1976	AC	1983			
69031	Ditton Brook	Greenbridge	CC	1981					
69032	Alt	Kirkby	CC		BC	1978			
69033	Alt	Sefton	CC	1954					
69034	Musbury Brook	Helmsmore Intake	AC	1984					
69035	Irwell	Bury Bridge	CC	1977					
69036	Eagley Brook	Longworth Clough	BB						Z
69037	Mersey	Westy	AC	1986					
69039	Medlock	New Viaduct Street	UB	1949					
69040	Irwell	Stubbins Brook	CC		BC	1980			
70001	Douglas	Rivington Reservoir	AC	1951					
70002	Douglas	Wanes Blades Bridge	CA	1980	BA	1984			
70003	Douglas	Central Park Wigan	CB	1977					
70004	Yarrow	Croston Mill	BB	1976					
70005	Lostock	Littlewood Bridge	CC	1978					
71001	Ribble	Samlesbury (PGS)	BB	1960	AB	1970	BB	1982	
71002	Hodder	Stocks Reservoir	AC	1936					
71003	Croasdale	Croasdale Flume	CA	1957					
71004	Calder	Whalley Weir	CB	1963	AB	1970			
71005	Bottoms Beck	Bottoms Beck Flume	CA	1960					
71006	Ribble	Henthorn	AB	1968					
71007	Ribble	Hodder Foot	CB						Z
71008	Hodder	Hodder Place	AC	1977					
71009	Ribble	New Jumbles Rock	AB	1980					
71010	Pendle	Barden Lane	BB	1971					

STN NO	UP1SYR	UP1FYR	UP2SYR	UP2FYR	PP1SYR	PP1FYR	PP2SYR	PP2FYR	OMIT1	OMIT2
69006										
69007										
69008	1984	1986			1984	1986				
69011										
69012	1985	1989								
69013	1982	1985								
69015										
69017	1977	1989								
69018										
69019										
69020	1976	1989								
69021										
69023										
69024										
69027										
69030										
69031										
69032										
69033										
69034										
69035										
69036										
69037										
69039										
69040										
70001										
70002	1984	1989								
70003										
70004	1976	1989								
70005										
71001	1960	1989								
71002										
71003										
71004	1970	1989								
71005										
71006	1968	1989								
71007										
71008										
71009	1980	1989								
71010	1971	1989								

STN NO	RIVER	STATION	G1 SYR1	G2 SYR2	G3 SYR3	CODE
71011	Ribble	Arnford	CA 1966	AA 1972		
71013	Darwen	Ewood Bridge	BC 1980			
71014	Darwen	Blue Bridge	BC 1977			
72001	Lune	Halton	BB 1959			
72002	Wyre	St. Michael's	BB 1963	AB 1976		
72004	Lune	Caton	AA 1959			
72005	Lune	Killington New Bridge	AA 1969			
72006	Lune	Kirkby Lonsdale				Z
72007	Brock	Upstream A6	AA 1985			
72008	Wyre	Garstang	BB 1967	AB 1969		
72009	Wenning	Wennington	AA 1981			
72010	Lune	Tebay				Z
72011	Rawthey	Briggs Flatts	AA 1968			
72015	Lune	Lunes Bridge	BA 1985			
72016	Wyre	Scorton Weir	CC 1981			
72804	Lune	Broadraine	BA 1966			
72811	Brock	Roe Bridge	AB 1970			
72814	Calder	Sandholme Bridge	AA 1971			
72817	Barton Brook	Hollowforth Hall	AA 1972			
72818	New Mill Brook	Carvers Bridge	AA 1972			
72820	Burnes Gill	Tebay (M6)	AA 1973			
73001	Leven	Newby Bridge	CB 1970			Z
73002	Crake	Low Nibthwaite	AA 1963			
73003	Kent	Burneside	AA 1981			
73005	Kent	Sedgewick	AA 1968			
73007	Troutbeck	Troutbeck Bridge				Z
73008	Bela	Beetham	AA 1969			
73009	Sprint	Sprint Mill	AA 1981			
73010	Leven	Newby Bridge	BB 1939	AB 1971		
73011	Mint	Mint Bridge	AA 1970			
73013	Rothay	Miller Bridge House	BA 1987			
73014	Brathay	Jeffy Knotts				Z
73015	Keer	High Keer Weir				Z
74001	Duddon	Duddon Hall	AB 1968			
74002	Irt	Galesyke	AB 1967			
74003	Ehen	Ennerdale	AB 1973			
74005	Ehen	Braystones	BB 1974			
74006	Calder	Calder Hall	AC 1964			
74007	Esk	Cropple Howe	BA 1976			
74008	Duddon	Ulpha	CB 1977			

STN NO	UP1SYR	UP1FYR	UP2SYR	UP2FYR	PP1SYR	PP1FYR	PP2SYR	PP2FYR	OMIT1	OMIT2
71011	1972	1989			1972	1989				
71013										
71014										
72001	1959	1976								
72002	1963	1989								
72004	1959	1989			1959	1989				
72005	1969	1989			1969	1989				
72006										
72007	1985	1989			1985	1989				
72008	1967	1989								
72009	1981	1989			1981	1989				
72010										
72011	1968	1988			1968	1988				
72015	1985	1989								
72016										
72804	1966	1972								
72811	1970	1976								
72814	1971	1976			1971	1976				
72817	1972	1975			1972	1975				
72818	1972	1974			1972	1974				
72820	1973	1974			1973	1974				
73001										
73002	1963	1989			1963	1989				
73003	1981	1987			1981	1987				
73005	1968	1989			1968	1989				
73007										
73008	1969	1989			1969	1989				
73009	1981	1989			1981	1989				
73010	1939	1989								
73011	1970	1987			1970	1987				
73013	1987	1988								
73014										
73015										
74001	1968	1989								
74002	1967	1989								
74003	1973	1989								
74005	1974	1989								
74006										
74007	1976	1989								
74008										

STN NO	RIVER	STATION	G1	SYR1	G2	SYR2	G3	SYR3	CODE
75001	St. John's	Thirlmere	CC	1935					
75002	Derwent	Camerton	AA	1960					
75003	Derwent	Ouse Bridge	AA	1968					
75004	Cocker	Southwaite Bridge	BB	1967					
75005	Derwent	Portinscale	CA	1972					
75006	Newlands Beck	Braithwaite	BA	1968					
75007	Glenderamackin	Threlkeld	BA	1969					
75009	Greta	Low Briery	AA	1971					
75010	Marron	Ullock	AA	1972					
75016	Cocker	Scalehill	BC	1977					
75017	Ellen	Bull Gill	BB	1982					
76001	Haweswater Beck	Burnbanks	BC	1953					
76002	Eden	Warwick Bridge	BA	1966					
76003	Eamont	Udford	BC	1961					
76004	Lowther	Eamont Bridge	BB	1962					
76005	Eden	Temple Sowerby	BA	1964					
76007	Eden	Sheepmount	AA	1967					
76008	Irthing	Greenholme	AB	1967					
76009	Caldew	Holm Hill	BA	1968					
76010	Petteril	Harraby Green	BA	1970					
76011	Coal Burn	Coal Burn	AA	1967					
76014	Eden	Kirkby Stephen	AA	1971					
76015	Eamont	Pooley Bridge	AC	1970					
76805	Force Beck	Shap	AA	1973					
77001	Esk	Netherby	BA	1963					
77002	Esk	Canonbie	AA	1962					
77003	Liddel Water	Rowanburnfoot	AA	1973					
77004	Kirtle Water	Mossknowe	AA	1979					
77005	Lyne	Cliff Bridge	BA	1977					
78001	Annan	St Mangos Manse	CA	1958					
78002	Ae	Elshieshields	CA	1963					
78003	Annan	Brydekirk	AA	1967					
78004	Kinnel Water	Redhall	CA	1963	AA	1967			
78005	Kinnel Water	Bridgemuir	AA	1979					
78006	Annan	Woodfoot	AA	1983					
79001	Afton Water	Afton Reservoir	AC	1965					
79002	Nith	Friars Carse	AA	1957					
79003	Nith	Hall Bridge	AA	1959					
79004	Scar Water	Capenoch	AA	1963					
79005	Cluden Water	Fiddlers Ford	AA	1963					

STN NO	UP1SYR	UP1FYR	UP2SYR	UP2FYR	PP1SYR	PP1FYR	PP2SYR	PP2FYR	OMIT1	OMIT2
75001										
75002	1960	1989			1960	1989				
75003	1968	1989			1968	1989				
75004	1967	1989								
75005										
75006	1968	1980								
75007	1969	1978								
75009	1971	1989			1971	1989				
75010	1972	1977			1972	1977				
75016										
75017	1982	1989								
76001										
76002	1966	1989								
76003										
76004	1962	1989								
76005	1964	1989								
76007	1967	1989			1967	1989				
76008	1967	1989								
76009	1968	1989								
76010	1970	1989								
76011	1967	1989			1967	1989				
76014	1971	1989			1971	1989				
76015										
76805	1973	1975			1973	1975				
77001	1963	1989								
77002	1962	1988			1962	1988				
77003	1973	1988			1973	1988				
77004	1979	1989			1979	1989				
77005	1977	1988								
78001										
78002										
78003	1967	1988			1967	1988				
78004	1967	1989			1967	1989				
78005	1979	1988			1979	1988				
78006	1983	1989			1983	1989				
79001										
79002	1957	1989			1957	1989				
79003	1959	1989			1959	1989				
79004	1963	1989			1963	1989				
79005	1963	1989			1963	1989				

STN NO	RIVER	STATION	G1	SYR1	G2	SYR2	G3	SYR3	CODE
79006	Nith	Drumlanrig	AA	1967					
80001	Urr	Dalbeattie	AA	1963					
80002	Dee	Glenlochar	AC	1977					
80003	White Laggan Burn	Loch Dee	AA	1980					
80004	Blackwater	Loch Dee	AA	1982					
80005	Dargall Lane	Loch Dee	AA	1983					
80006	Green Burn	Loch Dee	AA	1983					
80801	Pullaugh Burn	Diversion Works							Z
81001	Penwhirn Burn	Penwhirn Res.	AC	1965					
81002	Cree	Newton Stewart	BA	1963	AA	1983			
81003	Luce	Airyhemming	AB	1967					
81004	Bladnoch	Low Malzie	AA	1977					
81005	Piltanton Burn	Barsolus	AA	1985					
81006	Water of Minnoch	Minnoch Bridge	AA	1986					
81007	Water of Fleet	Rusko	AA	1988					
82001	Girvan	Robstone	BB	1963					
82002	Doon	Auchendrane	AC	1974					
82003	Stinchar	Balnowlart	AA	1973					
83001	Caaf Water	Knockendon Res.							Z
83002	Garnock	Dalry	AC	1963					
83003	Ayr	Catrine	AB	1970					
83004	Lugar	Langholm	AA	1972					
83005	Irvine	Shewalton	AA	1972					
83006	Ayr	Mainholm	BB	1976					
83007	Lugton	Eglinton	BA	1977					
83008	Annick Water	Dreghorn	BA	1980					
83009	Garnock	Kilwinning	AA	1978					
83010	Irvine	Newmilns	CA		AA	1976			
83802	Irvine	Kilmarnock							Z
84001	Kelvin	Killermont	BC	1948					
84002	Calder	Muirshiel	AC	1952					
84003	Clyde	Hazelbank	AA	1956					
84004	Clyde	Sills	AA	1957					
84005	Clyde	Blairston	AA	1958					
84006	Kelvin	Bridgend	CB	1963					
84007	South Calder Water	Forgewood	AC	1965					
84008	Rotten Calder Water	Redlees	AC	1966					
84009	Nethan	Kirkmuirhill	AC	1968					
84011	Gryfe	Craighill	AC	1963					
84012	White Cart Water	Hawkhead	AA	1963					

STN NO	UP1SYR	UP1FYR	UP2SYR	UP2FYR	PP1SYR	PP1FYR	PP2SYR	PP2FYR	OMIT1	OMIT2
79006	1967	1989			1967	1989				
80001	1963	1989			1963	1989				
80002										
80003	1980	1989			1980	1989				
80004	1982	1989			1982	1989				
80005	1983	1989			1983	1989				
80006	1983	1989			1983	1989				
80801										
81001										
81002	1963	1989			1983	1989				
81003	1967	1989								
81004	1977	1989			1977	1989				
81005	1985	1989			1985	1989				
81006	1986	1989			1986	1989				
81007	1988	1989			1988	1989				
82001	1963	1989								
82002										
82003	1973	1989			1973	1989				
83001										
83002										
83003	1970	1989								
83004	1972	1989			1972	1989				
83005	1972	1989			1972	1989				
83006	1976	1989								
83007	1977	1989								
83008	1980	1989								
83009	1978	1989			1978	1989				
83010	1977	1989			1977	1989				
83802										
84001										
84002										
84003	1956	1989			1956	1989				
84004	1957	1989			1957	1989				
84005	1958	1989			1958	1989				
84006										
84007										
84008										
84009										
84011										
84012	1963	1989			1963	1989				

STN NO	RIVER	STATION	G1	SYR1	G2	SYR2	G3	SYR3	CODE
84013	Clyde	Daldowie	AA	1963					
84014	Avon Water	Fairholm	AA	1964					
84015	Kelvin	Dryfield	BA	1960	AA	1971			
84016	Luggie Water	Condorrat	CA	1966	AA	1969			
84017	Black Cart Water	Milliken Park	AC	1967					
84018	Clyde	Tulliford Mill	AA	1969					
84019	North Calder Water	Calder Park	BC	1963					
84020	Glazert Water	Milton of Campsie	AA	1968					
84021	White Cart Water	Netherlee	CA	1969					
84022	Duneaton	Maidencots	AA	1966					
84023	Bothlin Burn	Auchengeich	AC	1973					
84024	North Calder Water	Hillend	AC	1972					
84025	Luggie Water	Oxgang	AB	1975					
84026	Allander Water	Milngavie	CA		AA	1974			
84027	North Calder Water	Calderbank	AC	1968					
84028	Monkland Canal	Woodhall	AC	1975					
84029	Cander Water	Candermill	AA	1975					
84030	White Cart Water	Overlee	AB	1981					
84031	Whatstone Burn	Watstone							Z
84806	Clyde	Cambusnethan							Z
85001	Leven	Linnbrane	AA	1963	AC	1971			
85002	Endrick Water	Gaidrew	AB	1963					
85003	Falloch	Glen Falloch	AB	1970					
85004	Luss Water	Luss	AA	1976					
86001	Little Eachaig	Dalinlongart	AC	1968					
86002	Eachaig	Eckford	AC	1968					
87801	Allt Uaine	Intake	AA	1950					
89008	Eas Daimh	Eas Daimh	AA	1981					
89009	Eas A Ghail	Succoth	AA	1981					
89803	Orchy	Falls of Orchy							Z
89804	Strae	Duiletter							Z
89805	Lochy	Inverlochy	AA	1978					
89807	Abhainn A Bhealaich	Braevallich	AA	1981					
90001	Leven	Blackwater Reservoir							Z
90002	Creran	Taraphocain	AA	1977					
90003	Nevis	Claggan	AB	1982					
91001	Lochy	Lochaber H.E.P.							Z
91002	Lochy	Camisky	AC	1980					
91003	Mucomir Cut	Gairlochy							Z
91802	Allt Leachdach	Intake							Z

STN NO	UP1SYR	UP1FYR	UP2SYR	UP2FYR	PP1SYR	PP1FYR	PP2SYR	PP2FYR	OMIT1	OMIT2
84013	1963	1989			1963	1989				
84014	1964	1989			1964	1989				
84015	1960	1989			1971	1989				
84016	1969	1989			1969	1989				
84017										
84018	1969	1989			1969	1989			1975	1986
84019										
84020	1968	1989			1968	1989				
84021										
84022	1966	1989			1966	1989			1968	
84023										
84024										
84025	1975	1989								
84026	1974	1989			1974	1989				
84027										
84028										
84029	1975	1989			1975	1989			1979	1988
84030	1981	1989								
84031										
84806										
85001	1963	1970			1963	1970				
85002	1963	1989								
85003	1970	1989								
85004	1976	1989			1976	1989				
86001										
86002										
87801	1950	1975			1950	1975				
89008	1981	1989			1981	1989				
89009	1981	1989			1981	1989				
89803										
89804										
89805	1978	1989			1978	1989				
89807	1981	1989			1981	1989				
90001										
90002	1977	1981			1977	1981				
90003	1982	1989								
91001										
91002										
91003										
91802										

STN NO	RIVER	STATION	G1	SYR1	G2	SYR2	G3	SYR3	CODE
92803	Allt Coire	Polloch	BA						Z
93001	Carron	New Kelso	AA	1979					
94001	Ewe	Poolewe	AA	1970					
95001	Inver	Little Assynt	AA	1977					
95002	Broom	Inverbroom	AC	1985					
96001	Halladale	Halladale	AA	1976					
96002	Naver	Apigill	AA	1977					
96003	Strathy	Strathy Bridge	AA	1985					
96004	Allnabad	Strathmore	AA						Z
97001	Calder Burn	Achavarn							Z
97002	Thurso	Halkirk	AB	1972					
10100	Eastern Yar	Alverstone Mill	CB	1961					
10100	Medina	Upper Shide	AC	1965					
10100	Lukely Brook	Newport	AC	1980					
10100	Eastern Yar	Burnt House	BC	1982					
10100	Eastern Yar	Budbridge	AB	1982					
10100	Wroxhall Stream	Waightshale	BB	1988					
10100	Scotchells Brook	Burnt House	AB	1982					
20100	Owenkillew	Killymore Bridge							Z
20100	Fairy Water	Dudgeon Bridge	AA	1971					
20100	Camowen	Camowen Terrace	AA	1972					
20100	Drumragh	Campsie Bridge	AA	1972					
20100	Burn Dennet	Burndennet Bridge	AA	1975					
20100	Derg	Castlederg	AA	1976					
20100	Owenkillew	Crosh	AA	1980					
20101	Mourne	Drumnabuoy House	AA	1982					
20200	Roe	Ardnagle							Z
20200	Faughn	Drumahoe	AB	1976					
20300	Lower Bann	Movanagher Weir							Z
20300	Lower Bann	Newferry							Z
20300	Braid	Ballymena							Z
20301	Blackwater	Maydown Bridge	AA	1970					
20301	Main	Dromona	AA	1970					
20301	Ballinderry	Ballinderry Bridge	AA	1970					
20301	Main	Andraid	AA	1970					
20301	Upper Bann	Dynes Bridge	AA	1970					
20301	Six Mile Water	Antrim	AA	1970					
20301	Claudy	Glenone Bridge	AA	1972					
20302	Moyola	Moyola New Bridge	AA	1971					
20302	Kells Water	Currys Bridge	AA	1971					

STN NO	UP1SYR	UP1FYR	UP2SYR	UP2FYR	PP1SYR	PP1FYR	PP2SYR	PP2FYR	OMIT1	OMIT2
92803										
93001	1979	1989			1979	1989				
94001	1970	1989			1970	1989				
95001	1977	1989			1977	1989				
95002										
96001	1976	1989			1976	1989				
96002	1977	1989			1977	1989				
96003	1985	1989			1985	1989				
96004										
97001										
97002	1972	1989								
10100										
10100										
10100										
10100										
10100	1982	1989								
10100	1988	1989								
10100	1982	1989								
20100										
20100	1971	1989			1971	1989				
20100	1972	1989			1972	1989				
20100	1972	1989			1972	1989				
20100	1975	1989			1975	1989				
20100	1976	1989			1976	1989				
20100	1980	1989			1980	1989				
20101	1982	1989			1982	1989				
20200										
20200	1976	1989								
20300										
20300										
20300										
20301	1970	1989			1970	1989				
20301	1970	1980			1970	1980				
20301	1970	1989			1970	1989				
20301	1970	1989			1970	1989				
20301	1970	1989			1970	1989				
20301	1970	1989			1970	1989				
20301	1972	1989			1972	1989				
20302	1971	1989			1971	1989				
20302	1971	1989			1971	1989				

STN NO	RIVER	STATION	G1	SYR1	G2	SYR2	G3	SYR3	CODE
20302	Torrent	The Moor Bridge							Z
20302	Cusher	Gambles Bridge	AA	1971					
20302	Callan	Callan New Bridge	AA	1971					
20302	Glenavy	Glenavy	AA	1971					
20302	Braid	Ballee	CB	1972					
20302	Agivey	White Hill	AA	1972					
20302	Six Mile Water	Ballyclare	AA	1973					
20303	Upper Bann	Bannfield	AA	1975					
20303	Aghill Burn	Craigs							Z
20303	Upper Bann	Hilltown							Z
20303	Leitrim	Leitrim Bridge							Z
20303	Rocky	Rocky Mountain							Z
20303	Clogh	Tullynewy Bridge							Z
20304	Lower Bann	Movanagher	AC	1980					
20304	Ballygawley Water	Tullybryan							Z
20304	Crumlin	Cidercourt Bridge	AA	1981					
20304	Oona Water	Shanmoy							Z
20304	Ballynaloob Burn	Ballynaloob							Z
20304	Engine Burn	Springmount							Z
20304	Rathmore Burn	Rathmore Bridge							Z
20304	Four Mile Burn	Newmill							Z
20304	Main	Dunloy Stn Road							Z
20309	Main	Dunminning - Lower							Z
20309	Main	Shane's Viaduct							Z
20400	Bush	Seneirl	AA	1972					
20500	Lagan	Dunmurry	AA	1971					
20500	Lagan	Newforge	AA	1972					
20500	Ravernet	Ravernet	AA	1972					
20500	Lagan	Blaris	AA	1972					
20500	Lagan	Drummiller	AA	1974					
20501	Lagan	Banoge	AA	1974					
20501	Annacloy	Kilmore							Z
20501	Annahilt	Watsons Bridge							Z
20501	Waringstown	Primary Walk							Z
20501	Motte	Brook Street							Z
20501	Cotton	Grandmere Park							Z
20502	Enler	Comber	AA	1983					
20600	Clanrye	Mount Mill Bridge	AA	1976					
20600	Jerretts Pass	Jerretts Pass (River)	AA	1976					
20600	Newry Canal	Jerretts Pass (Canal)							Z

STN NO	UP1SYR	UP1FYR	UP2SYR	UP2FYR	PP1SYR	PP1FYR	PP2SYR	PP2FYR	OMIT1	OMIT2
20302										
20302	1971	1989			1971	1989			1980	
20302	1971	1989			1971	1989				
20302	1971	1989			1971	1989				
20302										
20302	1972	1989			1972	1989				
20302	1973	1989			1973	1989				
20303	1975	1989			1975	1989				
20303										
20303										
20303										
20303										
20303										
20304										
20304										
20304	1981	1989			1981	1989				
20304										
20304										
20304										
20304										
20304										
20304										
20309										
20309										
20400	1972	1989			1972	1989				
20500	1971	1984			1971	1984				
20500	1972	1989			1972	1989				
20500	1972	1989			1972	1989				
20500	1972	1980			1972	1980				
20500	1974	1989			1974	1989				
20501	1974	1989			1974	1989				
20501										
20501										
20501										
20501										
20501										
20502	1983	1989			1983	1989				
20600	1976	1980			1976	1980				
20600	1976	1989			1976	1989				
20600										

STN NO	RIVER	STATION	G1	SYR1	G2	SYR2	G3	SYR3	CODE
20600	Bessbrook	Carnbane							Z
23600	Colebrooke	Ballindarragh Bridge	AA	1975					
23600	Sillees	Drumrainy Bridge	BA	1981					

STN NO	UP1SYR	UP1FYR	UP2SYR	UP2FYR	PP1SYR	PP1FYR	PP2SYR	PP2FYR	OMIT1	OMIT2
20600										
23600	1975	1989			1975	1989				
23600	1981	1989								

Appendix 2 Calculation of low flow statistics from flow data

Q95(1)	95 percentile 1-day flow, expressed as % mean flow
MEAN FLOW	Mean flow calculated from those years of data used in the calculation of Q95(1), $m^3 s^{-1}$
MAM(7)	Mean annual 7-day minimum flow, % mean flow
MEAN FLOW(M)	Mean flow calculated from those years of data used in the calculation of MAM(7), $m^3 s^{-1}$
BFI	Base Flow Index
UPYRS	Number of years of data in the usable period of record

STN NO	Q95(1)	MEAN FLOW	MAM(7)	MEAN FLOW(M)	BFI	UPYRS
2001	24.078	12.605	21.939	12.602	0.485	15
3001	14.170	16.809	14.408	16.425	0.567	5
3002	10.824	8.705	9.925	8.703	0.317	16
3003	6.547	16.667	5.783	16.554	0.240	13
3004	10.554	7.166	7.628	7.078	0.239	11
3803	11.102	2.076	9.477	2.058	0.276	8
4003	12.494	5.013	10.298	5.012	0.447	5
4005	8.914	6.968	6.022	6.967	0.272	4
5802	15.390	13.949	10.985	14.121	0.330	6
6001	14.966	73.962	15.639	72.302	0.499	21
6003	8.864	20.726	6.553	20.394	0.290	17
6006	6.462	0.880	6.929	0.860	0.291	10
6008	2.129	3.042	3.563	3.016	0.340	11
7001	15.540	13.316	14.887	13.336	0.371	30
7002	17.621	18.632	18.040	18.653	0.411	32
7003	27.185	2.618	28.438	2.592	0.520	27
7004	14.252	5.638	16.313	5.638	0.452	11
7005	18.862	2.924	20.518	2.828	0.424	13
7006	27.384	0.382	29.159	0.366	0.463	3
8001	29.855	56.352	30.195	55.910	0.579	37
8002	28.027	21.226	26.136	21.184	0.574	39
8004	27.861	14.609	29.469	14.519	0.556	38
8005	31.517	28.130	32.205	28.077	0.615	39
8006	30.123	64.259	30.693	64.089	0.606	38
8009	19.360	5.889	21.583	5.875	0.467	38
8010	29.227	36.752	28.711	36.456	0.601	37
8011	33.767	2.265	36.898	2.263	0.650	12
9001	25.907	8.975	29.044	8.940	0.590	30
9002	21.734	16.515	24.764	16.324	0.581	30
9003	21.298	2.635	24.965	2.634	0.537	20
9004	27.294	3.144	33.037	3.090	0.701	10
9005	29.142	1.575	30.843	1.560	0.499	41
10001	23.641	6.719	30.683	6.663	0.718	19
10002	23.004	4.588	29.045	4.672	0.634	19
10003	20.300	7.548	30.550	7.899	0.737	7
11001	26.292	20.172	31.279	20.154	0.681	21
11002	28.015	14.153	32.350	14.317	0.672	21
11003	29.007	10.354	33.546	10.509	0.678	17
12001	23.059	36.313	23.140	36.212	0.535	61
12002	18.539	45.780	18.893	45.850	0.540	18
12003	20.200	22.680	20.254	22.985	0.514	15
12004	8.305	0.493	9.107	0.502	0.418	20
12005	17.240	3.639	18.489	3.607	0.529	14
12006	20.762	3.987	22.767	3.962	0.555	12
12007	18.042	12.462	15.174	12.048	0.489	8
12008	16.249	5.448	19.771	5.079	0.494	5
13001	15.145	2.196	21.459	2.151	0.554	11
13002	16.652	2.364	21.818	2.363	0.581	8
13003	16.877	13.308	16.283	13.307	0.531	4
13004	22.738	3.043	25.141	3.043	0.607	5

STN NO	Q95(1)	MEAN FLOW	MAM(7)	MEAN FLOW(M)	BFI	UPYRS
13005	10.602	1.701	15.391	1.732	0.509	9
13007	15.582	19.686	17.569	19.677	0.527	14
13008	16.173	12.112	19.430	12.111	0.590	7
13009	21.440	3.595	22.710	3.594	0.554	4
14001	24.312	3.817	27.109	3.813	0.613	23
14002	14.900	1.540	17.413	1.545	0.584	21
15001	27.247	2.705	29.388	2.707	0.565	16
15002	28.382	0.483	25.914	0.492	0.577	10
15004	23.119	0.555	23.352	0.566	0.625	42
15005	21.739	1.000	21.616	1.019	0.575	42
15008	22.990	2.604	24.258	2.596	0.577	32
15010	19.902	7.599	20.212	7.595	0.543	18
15013	13.491	5.207	14.090	5.204	0.447	35
15021	10.022	1.460	10.189	1.460	0.678	4
15023	6.596	7.091	7.697	7.089	0.458	7
15024	6.176	15.824	4.419	16.090	0.280	8
15025	15.918	12.592	15.874	12.591	0.500	5
16001	13.096	20.862	12.728	20.857	0.457	10
16003	6.850	4.901	5.877	4.889	0.304	20
17004	11.006	2.024	20.121	2.028	0.551	18
17005	15.914	3.737	16.283	3.642	0.403	19
17008	13.154	0.840	12.487	0.840	0.540	2
17015	10.563	0.699	9.556	0.698	0.450	3
17017	3.320	0.148	6.805	0.148	0.261	2
18001	16.310	4.940	16.512	4.928	0.449	33
18002	23.468	4.107	24.358	4.105	0.535	20
18005	13.482	6.299	13.455	6.345	0.464	19
18008	6.117	12.386	5.063	12.340	0.368	17
18010	8.654	15.282	7.562	15.273	0.348	4
18012	11.215	1.421	8.142	1.660	0.405	2
18014	28.233	0.913	25.887	0.913	0.555	4
18016	2.483	0.118	1.724	0.118	0.148	4
18017	4.088	0.520	3.725	0.520	0.185	7
18018	11.425	0.417	12.063	0.404	0.402	7
18019	4.759	0.083	2.314	0.083	0.153	2
19002	16.592	0.946	15.797	0.945	0.340	28
19003	8.140	0.735	10.177	0.729	0.334	8
19004	23.712	1.484	24.256	1.483	0.538	30
19007	24.121	3.957	25.074	3.955	0.522	28
19008	24.726	1.339	29.624	1.338	0.548	26
19011	26.967	2.059	26.983	2.057	0.522	27
19014	14.648	0.821	10.692	0.862	0.373	2
19017	10.866	0.466	11.942	0.466	0.415	4
19811	11.749	0.625	8.948	0.624	0.284	4
20001	19.897	2.760	22.986	2.758	0.524	29
20003	20.058	1.355	23.873	1.336	0.495	25
20005	18.627	0.936	20.958	0.927	0.488	25
20006	25.840	0.566	34.721	0.566	0.625	17
20007	22.707	0.706	27.105	0.706	0.578	17
20008	14.699	0.134	11.231	0.134	0.641	2

STN NO	Q95(1)	MEAN FLOW	MAM(7)	MEAN FLOW(M)	BFI	UPYRS
20806	5.230	0.024	2.947	0.024	0.299	4
20807	15.038	0.075	21.554	0.062	0.671	7
20808	8.217	0.012	14.089	0.017	0.490	10
21001	18.273	0.669	14.711	0.689	0.284	8
21002	12.462	1.041	14.866	1.041	0.534	6
21003	21.573	14.950	22.362	14.846	0.550	31
21005	22.820	8.817	22.522	8.768	0.561	29
21006	18.939	35.311	18.144	35.146	0.506	29
21007	12.665	14.748	11.484	14.671	0.399	29
21008	15.008	19.472	15.344	19.362	0.451	30
21009	18.528	77.210	18.387	77.044	0.521	28
21010	18.993	42.898	18.189	42.022	0.513	21
21011	15.129	6.713	14.426	6.668	0.463	27
21012	12.136	8.367	12.064	8.293	0.432	27
21013	14.880	3.566	16.230	3.564	0.513	26
21014	22.810	3.906	22.821	3.887	0.449	29
21015	13.624	3.423	15.320	3.386	0.490	24
21016	10.684	1.279	14.456	1.272	0.441	23
21017	10.265	1.811	9.700	1.806	0.342	25
21018	23.819	2.870	24.515	2.858	0.592	22
21019	19.585	1.550	19.585	1.543	0.601	22
21020	14.532	5.101	14.613	5.091	0.465	23
21021	16.790	61.372	16.742	61.867	0.505	21
21022	17.770	6.329	21.165	6.339	0.524	21
21023	2.966	0.863	4.530	0.863	0.348	20
21024	17.390	2.278	19.518	2.299	0.418	19
21025	8.973	2.580	9.847	2.595	0.429	18
21026	5.634	1.315	5.106	1.339	0.267	17
21027	15.617	1.766	19.000	1.775	0.495	17
21028	14.918	0.207	14.348	0.206	0.425	5
21030	14.198	2.004	14.324	1.999	0.422	22
21031	17.616	8.480	21.892	8.438	0.575	25
21032	15.114	2.824	15.857	2.790	0.482	24
21034	13.470	3.747	11.173	3.786	0.432	15
21805	16.879	4.870	18.009	4.955	0.474	16
22001	15.525	8.656	16.942	8.574	0.449	27
22002	16.991	1.211	19.399	1.193	0.471	24
22003	16.318	0.563	16.492	0.567	0.394	24
22004	19.743	2.266	21.485	2.107	0.469	9
22006	5.743	2.145	6.949	2.111	0.342	24
22007	6.758	3.264	7.540	3.236	0.374	22
22008	14.757	0.518	13.907	0.516	0.450	13
22009	15.356	5.594	16.359	5.715	0.476	18
23001	11.807	43.349	12.448	43.411	0.344	24
23002	10.357	1.948	14.443	1.861	0.431	11
23003	10.190	19.911	9.695	19.792	0.291	21
23004	11.314	17.341	10.837	17.571	0.338	18
23005	11.471	7.943	10.063	7.791	0.275	11
23006	12.934	10.587	12.447	10.488	0.330	24
23007	25.969	3.916	29.132	3.968	0.573	3

STN NO	Q95(1)	MEAN FLOW	MAM(7)	MEAN FLOW(M)	BFI	UPYRS
23008	10.510	5.893	10.258	5.872	0.330	22
23010	8.076	1.750	7.109	1.761	0.267	11
23011	15.036	1.861	14.476	1.850	0.334	20
23014	12.708	0.815	12.834	0.800	0.345	15
24001	17.677	11.220	18.105	11.165	0.415	33
24002	15.774	0.914	22.733	0.910	0.513	26
24003	13.927	3.633	13.728	3.606	0.344	32
24004	13.772	1.229	14.866	1.220	0.466	31
24006	10.901	0.795	11.988	0.796	0.353	24
24007	13.136	0.554	12.874	0.540	0.451	16
24008	16.010	7.673	15.717	7.580	0.443	18
25002	8.140	7.688	9.561	7.667	0.239	19
25003	4.966	0.552	4.317	0.553	0.147	24
25006	5.574	2.259	5.123	2.234	0.210	30
25007	12.358	0.751	14.789	0.745	0.536	20
25011	5.825	0.418	5.178	0.416	0.197	15
25012	6.559	0.978	6.197	0.975	0.228	21
25013	8.448	0.308	7.543	0.261	0.300	6
25019	28.223	0.200	29.230	0.203	0.586	19
25024	6.942	0.211	-9.999	-9.999	0.418	2
25025	8.488	0.432	-9.999	-9.999	0.200	6
25026	22.524	0.053	-9.999	-9.999	0.622	6
25027	9.323	0.053	9.607	0.062	0.302	7
25028	22.299	0.175	-9.999	-9.999	0.480	7
26003	24.875	0.672	37.833	0.699	0.957	31
26004	0.000	0.286	0.236	0.310	0.876	15
26005	0.007	0.233	2.470	0.203	0.953	9
26007	1.653	0.103	1.614	0.099	0.349	15
27002	12.007	17.813	13.027	18.108	0.376	10
27007	13.380	20.664	12.368	20.517	0.395	32
27008	18.946	20.631	20.905	19.337	0.479	30
27009	15.809	49.080	15.167	48.947	0.425	20
27010	17.184	0.345	19.156	0.350	0.486	44
27015	32.729	16.447	33.780	16.381	0.684	15
27023	17.621	1.439	19.721	1.393	0.465	30
27024	11.163	10.444	12.736	10.457	0.354	20
27027	14.880	13.794	14.395	13.728	0.374	15
27032	14.264	0.174	13.982	0.173	0.417	23
27033	5.679	1.381	6.512	1.368	0.429	21
27034	7.287	15.341	6.511	15.184	0.321	23
27035	8.198	6.175	7.603	6.152	0.371	22
27038	65.243	0.592	72.434	0.592	0.970	20
27040	24.507	0.693	26.181	0.698	0.511	20
27041	27.156	17.107	30.281	17.178	0.687	17
27042	22.073	1.093	23.458	1.104	0.601	18
27043	10.860	14.752	10.069	14.362	0.325	16
27044	9.523	0.405	12.398	0.405	0.459	16
27047	4.495	0.557	4.161	0.540	0.190	18
27049	23.777	3.669	27.075	3.643	0.675	16
27050	12.925	4.381	14.132	5.143	0.384	20

STN NO	Q95(1)	MEAN FLOW	MAM(7)	MEAN FLOW(M)	BFI	UPYRS
27051	6.065	0.111	5.278	0.116	0.312	18
27052	19.826	0.853	20.717	0.867	0.482	14
27054	21.003	0.678	23.144	0.683	0.533	16
27055	24.245	2.291	28.116	2.197	0.576	16
27056	28.956	0.866	35.195	0.816	0.686	16
27057	10.921	1.797	13.315	1.798	0.387	16
27058	42.698	0.461	46.018	0.440	0.648	16
27059	12.594	1.082	12.298	1.041	0.417	13
27060	1.396	10.830	1.757	10.794	0.068	11
27064	31.315	0.633	34.648	0.626	0.599	11
27066	5.993	0.261	6.616	0.261	0.312	6
27067	15.957	0.598	17.720	0.598	0.459	6
27069	6.674	3.839	6.849	3.838	0.170	5
27070	7.155	1.414	7.506	1.414	0.182	4
27071	17.246	19.996	18.109	20.336	0.504	10
27072	18.804	1.377	24.629	1.377	0.540	6
27073	11.120	0.252	26.810	0.248	0.914	6
27075	15.733	2.045	19.129	2.045	0.428	4
27076	8.564	0.352	13.155	0.352	0.628	4
27077	26.917	0.697	26.891	0.697	0.465	4
27083	7.970	0.739	11.688	1.083	0.449	3
28003	45.860	5.830	48.021	5.862	0.624	28
28008	23.736	7.594	26.602	7.609	0.612	37
28009	33.033	85.579	35.448	85.278	0.638	32
28010	27.094	17.639	30.586	17.619	0.610	30
28011	26.921	12.931	28.727	12.877	0.638	32
28014	28.422	5.174	30.751	5.149	0.648	18
28018	27.052	14.000	29.376	14.038	0.606	29
28020	26.177	3.675	31.568	3.451	0.550	29
28022	31.403	90.842	32.615	90.636	0.652	22
28024	11.013	2.843	12.028	2.795	0.416	23
28025	16.844	1.529	17.188	1.492	0.421	19
28029	8.433	0.381	13.899	0.357	0.381	19
28030	14.445	0.078	16.218	0.080	0.438	18
28031	18.772	3.562	20.819	3.575	0.534	22
28033	15.281	0.254	15.742	0.253	0.449	18
28035	44.605	0.817	44.457	0.784	0.878	4
28038	7.845	1.141	6.384	1.186	0.313	14
28040	20.357	0.614	21.874	0.614	0.481	7
28041	8.555	0.708	8.228	0.717	0.346	15
28043	22.645	6.674	25.463	6.649	0.545	22
28044	50.584	0.332	66.500	0.332	0.920	16
28046	29.942	1.958	33.360	1.973	0.786	21
28053	27.217	2.309	28.508	2.348	0.581	8
28054	14.151	1.124	14.430	1.112	0.391	14
28055	16.224	0.679	17.689	0.699	0.492	12
28058	12.697	0.502	12.472	0.508	0.457	11
28060	30.948	0.152	45.479	0.160	0.732	13
28066	21.199	0.966	20.375	0.968	0.437	17
28070	14.632	0.170	11.433	0.188	0.445	18

STN NO	Q95(1)	MEAN FLOW	MAM(7)	MEAN FLOW(M)	BFI	UPYRS
28072	35.895	0.347	37.348	0.361	0.682	10
28075	15.846	0.586	9.719	0.638	0.375	4
28079	26.446	0.624	29.035	0.616	0.630	9
28082	21.389	1.464	21.172	1.477	0.496	19
28083	40.829	3.940	41.710	4.029	0.658	8
28085	27.077	17.938	31.233	17.925	0.630	39
28086	14.458	1.048	14.615	1.070	0.390	19
28091	32.644	1.644	36.997	1.717	0.719	6
28093	26.801	9.787	30.970	10.521	0.499	4
29002	39.432	0.738	48.109	0.730	0.888	16
29003	28.528	0.478	34.925	0.472	0.901	22
29004	1.211	0.315	3.335	0.307	0.455	9
29005	12.200	0.470	15.672	0.465	0.539	19
29009	3.511	0.153	4.966	0.148	0.520	16
30001	18.184	1.514	21.308	1.555	0.678	18
30003	11.570	1.363	13.383	1.324	0.578	28
30004	32.876	0.516	35.494	0.524	0.656	28
30011	25.038	0.378	28.351	0.376	0.727	19
30012	4.878	0.273	7.710	0.270	0.446	20
30013	18.220	0.140	22.838	0.137	0.741	14
30015	25.988	0.316	30.799	0.321	0.893	14
30017	11.720	0.233	13.684	0.223	0.493	4
30018	28.629	0.132	29.582	0.136	0.682	6
30803	-9.999	0.041	-9.999	-9.999	0.528	3
31006	29.930	0.979	29.050	1.002	0.675	8
31010	11.953	0.539	15.717	0.533	0.513	21
31011	1.166	0.114	2.040	0.092	0.321	20
31012	26.172	0.096	38.320	0.050	0.788	17
31016	25.943	0.240	36.721	0.234	0.934	20
31017	9.223	0.142	7.219	0.167	0.552	16
31018	21.931	0.145	-9.999	-9.999	0.642	16
31019	16.194	0.100	23.806	0.073	0.535	19
31020	10.567	0.112	8.150	0.108	0.572	16
31022	3.177	0.076	2.062	0.078	0.390	19
31023	0.000	0.024	0.000	0.024	0.140	17
31024	13.106	0.125	36.623	0.122	0.954	18
31025	5.441	0.217	5.211	0.215	0.279	11
31026	5.549	0.020	2.257	0.020	0.339	11
32003	16.882	0.415	20.237	0.413	0.489	52
32004	15.079	1.358	20.669	1.374	0.548	47
32006	17.711	1.403	23.263	1.389	0.578	50
32012	16.922	0.130	-9.999	-9.999	0.736	15
32015	1.165	0.778	17.916	0.037	0.469	20
32016	3.931	0.041	8.359	0.037	0.353	18
32018	17.522	0.219	-9.999	-9.999	0.666	15
32019	24.571	0.252	-9.999	-9.999	0.768	19
32020	40.027	0.227	43.942	0.226	0.859	16
32024	19.370	0.041	22.375	0.035	0.455	15
32026	13.853	0.206	-9.999	-9.999	0.626	19
32027	0.000	0.053	1.934	0.052	0.395	15

STN NO	Q95(1)	MEAN FLOW	MAM(7)	MEAN FLOW(M)	BFI	UPYRS
32029	2.454	0.043	2.843	0.035	0.408	7
32030	37.628	0.078	32.705	0.085	0.663	4
32031	14.819	0.468	14.374	0.479	0.471	7
33002	9.697	10.270	13.062	10.250	0.510	57
33003	25.810	3.577	31.520	3.520	0.656	52
33006	30.299	1.868	32.350	1.892	0.814	25
33007	43.617	1.227	48.326	1.226	0.905	24
33009	15.010	9.462	16.263	9.545	0.518	32
33011	20.493	0.436	30.567	0.443	0.726	42
33013	18.058	0.693	26.004	0.699	0.642	37
33014	41.266	1.322	48.678	1.313	0.775	30
33015	23.491	1.930	25.352	1.908	0.556	24
33018	18.615	1.050	21.171	1.079	0.531	28
33019	25.430	1.885	27.319	1.868	0.777	28
33020	1.673	0.849	1.983	0.862	0.284	27
33021	23.202	1.250	30.493	1.255	0.736	28
33022	35.793	3.057	41.769	2.993	0.724	31
33024	34.878	0.989	43.313	1.013	0.768	41
33027	14.729	0.532	20.618	0.536	0.652	25
33029	15.903	0.533	23.139	0.530	0.849	25
33031	14.041	0.312	14.891	0.312	0.389	16
33032	26.205	0.213	43.889	0.214	0.964	25
33034	32.833	3.939	35.967	3.920	0.796	22
33037	11.292	5.210	13.442	5.235	0.477	21
33040	37.845	0.068	46.070	0.063	0.974	25
33044	24.527	1.531	24.500	1.549	0.738	19
33045	12.745	0.137	15.150	0.139	0.636	23
33046	15.125	0.895	15.654	0.904	0.626	23
33048	22.719	0.054	29.486	0.054	0.820	19
33049	42.686	0.265	42.127	0.266	0.885	8
33050	37.474	0.310	55.855	0.332	0.889	30
33051	34.921	0.613	39.336	0.626	0.677	25
33052	39.006	0.162	51.390	0.163	0.956	24
33054	45.084	0.523	54.342	0.532	0.944	14
33055	9.441	0.260	16.653	0.267	0.569	27
33058	26.297	1.883	30.273	1.932	0.594	12
33063	28.532	0.495	33.574	0.511	0.683	10
33066	11.063	0.219	14.949	0.218	0.476	9
33809	3.999	0.144	2.657	0.149	0.307	5
34001	25.384	1.451	25.522	1.454	0.652	31
34002	24.505	0.749	26.077	0.746	0.580	33
34003	53.292	1.115	56.349	1.121	0.830	31
34004	36.180	4.190	36.839	4.142	0.731	30
34005	28.269	0.354	29.130	0.351	0.648	29
34006	16.749	1.876	17.613	1.878	0.458	22
34007	19.378	0.742	21.021	0.703	0.410	19
34008	57.737	0.317	53.750	0.314	0.863	24
34010	9.580	0.785	9.935	0.781	0.424	22
34011	31.490	0.910	41.594	0.896	0.826	23
34012	36.096	0.351	51.806	0.355	0.957	19

STN NO	Q95(1)	MEAN FLOW	MAM(7)	MEAN FLOW(M)	BFI	UPYRS
34014	38.430	2.712	39.678	2.681	0.747	20
34018	39.267	0.547	39.211	0.537	0.767	8
34019	50.151	2.212	51.959	2.244	0.795	15
35003	16.006	0.291	17.490	0.280	0.364	29
35004	22.460	0.323	24.758	0.315	0.455	25
35008	13.413	0.627	13.474	0.638	0.377	26
35011	16.258	0.326	-9.999	-9.999	0.670	19
35013	16.228	0.422	15.786	0.427	0.339	19
36002	14.750	0.487	17.116	0.475	0.435	30
36003	30.626	0.216	31.255	0.213	0.628	30
36005	13.840	0.702	18.376	0.705	0.460	28
36007	10.170	0.184	14.021	0.184	0.411	30
36009	2.410	0.126	2.860	0.125	0.314	22
36010	1.815	0.143	1.823	0.141	0.223	22
37001	14.850	2.012	15.577	2.010	0.387	28
37005	20.180	1.042	20.760	1.045	0.520	31
37008	26.121	1.055	27.841	1.043	0.545	25
37009	41.343	0.374	44.805	0.377	0.670	28
37011	16.268	0.361	16.586	0.363	0.428	27
37012	1.493	0.277	2.147	0.277	0.271	27
37013	11.969	0.296	11.995	0.298	0.337	27
37016	5.699	0.337	5.589	0.336	0.274	6
37019	19.266	0.340	20.042	0.344	0.367	25
37020	24.644	0.677	24.831	0.683	0.507	20
37021	28.513	0.231	31.807	0.232	0.589	20
37031	12.863	0.349	12.635	0.340	0.299	12
37033	15.184	0.051	16.952	0.052	0.354	15
38002	21.310	0.314	23.928	0.327	0.521	10
38003	46.334	0.539	64.220	0.537	0.937	38
38007	22.125	0.193	23.891	0.192	0.405	25
38014	7.443	0.156	10.931	0.157	0.272	34
38018	39.553	1.280	49.357	1.284	0.814	19
38022	25.139	0.427	30.721	0.428	0.411	18
38024	23.608	0.345	24.044	0.345	0.460	17
38026	8.164	0.318	9.122	0.306	0.383	16
38029	21.601	0.172	23.588	0.174	0.439	12
38030	46.493	0.624	52.093	0.619	0.772	11
39002	11.615	28.209	14.151	28.160	0.640	52
39003	37.030	1.655	64.299	1.809	0.850	28
39005	35.645	0.530	51.070	0.524	0.663	29
39006	22.484	3.293	29.511	3.286	0.864	40
39011	45.811	2.940	47.865	2.938	0.743	18
39015	46.242	0.391	57.958	0.391	0.937	27
39016	41.261	9.612	44.613	9.624	0.873	29
39017	0.000	0.102	0.000	0.100	0.157	28
39019	46.912	1.712	55.709	1.716	0.965	28
39020	29.852	1.332	37.319	1.328	0.939	27
39021	17.163	3.845	19.744	3.842	0.645	25
39022	43.289	2.153	46.147	2.150	0.755	25
39023	46.721	1.008	65.050	1.008	0.931	26

STN NO	Q95(1)	MEAN FLOW	MAM(7)	MEAN FLOW(M)	BFI	UPYRS
39028	41.382	0.744	44.949	0.744	0.950	22
39029	64.809	0.561	71.914	0.559	0.889	22
39031	40.695	1.017	51.570	1.018	0.982	22
39033	33.496	0.166	44.119	0.166	0.959	28
39034	18.000	3.690	21.118	3.687	0.707	20
39036	72.779	0.114	82.018	0.114	0.933	22
39042	11.661	0.759	15.418	0.761	0.777	18
39043	25.169	2.556	34.259	2.568	0.951	28
39046	11.351	27.172	10.486	28.656	0.614	17
39049	12.839	0.259	14.280	0.262	0.270	17
39051	21.763	0.850	27.549	0.832	0.741	22
39054	5.425	0.349	7.183	0.349	0.245	29
39056	34.914	0.406	35.124	0.403	0.609	13
39057	19.204	0.522	18.741	0.534	0.345	12
39058	43.073	0.186	43.444	0.188	0.638	12
39061	18.508	0.091	18.065	0.088	0.964	17
39065	37.217	0.048	46.305	0.049	0.979	20
39068	21.369	3.892	21.928	3.938	0.404	12
39072	32.295	58.158	30.661	57.030	0.721	11
39076	27.721	2.614	28.708	2.643	0.829	14
39078	25.721	0.658	25.606	0.674	0.707	12
39079	33.116	7.304	35.295	6.504	0.629	11
39081	22.121	1.524	25.673	1.543	0.614	28
39088	40.203	0.606	58.518	0.613	0.606	16
39089	27.599	0.161	45.671	0.158	0.923	15
39090	6.380	0.327	-9.999	-9.999	0.302	1
39093	11.287	1.023	15.185	1.006	0.160	12
39095	23.826	0.153	24.978	0.154	0.483	12
39096	8.849	0.164	13.818	0.161	0.252	11
39097	14.912	9.499	16.571	9.655	0.724	10
39098	5.651	0.190	6.083	0.178	0.177	6
39101	19.975	0.215	20.618	0.209	0.972	8
39102	39.180	0.276	45.563	0.291	0.885	6
40006	37.551	0.393	42.066	0.394	0.622	31
40007	19.813	2.991	17.630	2.969	0.468	30
40008	25.221	2.128	23.308	2.251	0.567	28
40011	35.394	3.275	38.748	3.293	0.698	26
40017	12.631	0.321	16.086	0.290	0.450	19
40020	13.143	0.705	15.603	0.781	0.441	17
40021	9.243	0.302	14.639	0.310	0.459	10
40024	14.037	0.347	14.702	0.335	0.438	8
41001	7.322	0.180	7.795	0.182	0.360	40
41002	17.140	0.250	18.259	0.239	0.512	39
41003	4.189	1.666	5.174	1.712	0.281	11
41005	11.782	2.174	13.021	2.120	0.473	18
41006	15.345	1.141	16.154	1.146	0.411	26
41009	34.595	4.867	36.896	4.941	0.620	18
41010	2.972	0.942	4.253	0.942	0.249	29
41011	29.719	2.180	31.507	2.176	0.626	24
41012	12.798	1.173	12.492	1.157	0.348	23

STN NO	Q95(1)	MEAN FLOW	MAM(7)	MEAN FLOW(M)	BFI	UPYRS
41013	10.586	0.153	10.763	0.153	0.362	40
41014	8.590	3.653	9.351	3.722	0.311	20
41016	9.729	0.136	7.739	0.199	0.437	51
41017	7.447	0.309	7.549	0.307	0.425	21
41020	6.036	0.463	6.862	0.461	0.276	21
41022	8.314	0.571	7.866	0.577	0.346	20
41024	19.876	0.246	18.111	0.258	0.527	7
41025	4.057	1.080	4.012	1.077	0.219	19
41026	12.125	0.397	13.166	0.399	0.522	19
41027	30.443	0.508	31.346	0.509	0.611	18
41028	6.307	0.283	6.647	0.266	0.383	26
41029	1.739	0.549	2.264	0.508	0.235	7
41806	0.000	0.015	0.000	0.015	0.410	3
41807	11.667	0.097	13.761	0.097	0.487	3
42001	6.538	0.643	7.443	0.627	0.408	39
42003	5.434	1.006	6.305	0.970	0.365	30
42006	21.013	0.980	26.674	0.974	0.935	32
42007	65.689	1.573	71.972	1.563	0.980	20
42009	55.618	0.542	59.935	0.543	0.964	20
42010	57.239	5.311	61.366	5.304	0.965	32
42011	21.352	0.419	31.203	0.423	0.668	18
42012	51.545	1.845	62.281	1.844	0.966	15
42014	17.793	0.967	19.460	0.892	0.491	14
42015	28.772	0.092	26.580	0.092	0.966	2
42016	66.481	4.391	65.588	4.306	0.978	9
42018	13.646	0.176	14.506	0.176	0.415	2
42019	26.543	0.175	26.053	0.167	0.690	13
42020	60.955	0.361	59.642	0.361	0.522	2
43003	38.543	15.647	40.534	15.479	0.909	21
43004	30.799	0.764	33.294	0.778	0.918	25
43005	35.086	3.488	37.540	3.534	0.913	25
43006	32.537	2.890	35.765	2.889	0.814	18
43007	20.112	13.114	22.866	13.106	0.661	17
43008	29.901	4.040	33.559	4.038	0.915	23
43011	15.136	0.758	46.372	0.847	0.843	7
43012	41.003	1.072	42.720	1.084	0.869	19
43014	58.413	0.791	62.246	0.794	0.893	19
43017	17.832	0.656	19.991	0.660	0.714	19
43019	35.155	0.550	36.455	0.551	0.661	17
43021	35.713	18.785	37.584	18.574	0.891	6
44001	36.583	6.695	39.101	6.694	0.843	20
44002	32.509	2.352	36.897	2.351	0.887	27
44003	34.412	0.582	36.863	0.581	0.646	15
44004	27.723	3.010	31.978	3.043	0.835	15
44006	33.346	0.182	37.160	0.182	0.864	21
44009	30.447	0.307	34.610	0.314	0.941	15
45001	12.091	15.285	12.484	15.384	0.512	23
45002	11.706	12.035	12.635	11.960	0.516	18
45003	27.071	3.749	26.874	3.753	0.526	28
45004	24.451	4.966	24.663	4.984	0.497	26

STN NO	Q95(1)	MEAN FLOW	MAM(7)	MEAN FLOW(M)	BFI	UPYRS
45005	31.116	3.125	31.582	3.111	0.530	27
45008	24.672	2.074	24.715	2.045	0.488	16
45010	5.856	1.106	10.199	1.106	0.547	6
45011	13.716	4.414	10.862	4.474	0.541	14
45012	8.509	3.947	8.648	3.917	0.451	24
45829	31.363	0.414	30.714	0.418	0.530	10
46002	12.480	9.214	14.307	9.279	0.546	34
46003	12.794	11.028	15.077	11.005	0.519	32
46005	14.873	1.204	15.746	1.210	0.426	26
46006	11.663	1.827	13.413	1.826	0.490	16
46008	12.779	3.161	13.096	3.297	0.509	11
46812	7.205	0.833	8.598	0.833	0.530	12
46818	2.011	0.087	2.581	0.089	0.378	11
47001	8.184	22.532	9.671	22.550	0.462	34
47004	14.901	4.404	15.605	4.329	0.574	27
47005	9.122	3.237	7.287	3.063	0.396	4
47006	8.784	5.000	13.519	5.209	0.489	19
47007	11.870	1.625	14.223	1.632	0.554	27
47008	3.435	2.413	4.032	2.404	0.384	21
47009	13.884	0.886	15.393	0.884	0.601	21
47014	17.774	1.778	19.139	1.794	0.591	9
47016	13.782	0.497	16.972	0.507	0.650	12
47017	1.777	0.770	3.433	0.770	0.378	10
48003	20.194	1.980	22.868	2.030	0.677	12
48004	22.735	0.808	25.067	0.805	0.720	21
48005	13.228	0.379	14.420	0.378	0.655	22
48006	17.567	1.041	20.498	1.034	0.732	13
48009	18.044	0.791	17.629	0.813	0.625	10
48010	21.047	1.014	22.644	1.005	0.725	33
49001	13.808	5.887	16.883	5.906	0.611	26
49002	22.877	0.987	24.830	0.979	0.827	33
49004	14.433	0.693	16.053	0.689	0.681	21
50002	5.693	15.613	5.977	15.635	0.387	28
50007	7.312	1.857	8.099	1.876	0.456	15
50807	9.719	3.744	8.420	3.890	0.394	2
50809	7.251	1.596	7.265	1.600	0.405	14
51001	19.885	0.990	20.765	0.996	0.634	23
51003	14.161	0.728	21.781	0.757	0.624	24
52003	26.691	1.087	29.553	1.077	0.738	29
52004	20.108	1.306	20.638	1.308	0.477	28
52007	16.857	1.121	18.619	1.117	0.447	24
52009	24.805	1.069	26.343	1.063	0.675	26
52010	13.437	1.874	14.666	1.882	0.472	26
52011	5.728	0.789	5.659	0.783	0.372	25
52015	26.347	0.250	27.602	0.250	0.683	19
52016	29.564	0.206	30.184	0.207	0.708	19
52020	3.712	0.251	5.503	0.233	0.266	13
53002	25.265	1.441	29.250	1.440	0.550	20
53005	18.625	2.189	19.925	2.216	0.612	29
53006	11.608	1.702	12.547	1.709	0.391	29

STN NO	Q95(1)	MEAN FLOW	MAM(7)	MEAN FLOW(M)	BFI	UPYRS
53007	16.902	3.773	17.988	3.788	0.522	29
53008	10.258	3.078	13.638	3.077	0.559	13
53009	18.804	1.280	19.143	1.279	0.616	24
53013	21.766	1.202	23.233	1.201	0.638	20
53017	9.699	0.575	10.607	0.577	0.457	17
53018	21.179	15.942	21.585	15.900	0.604	8
53019	5.210	0.545	7.576	0.552	0.348	21
53025	12.050	1.638	13.363	1.638	0.567	10
53026	10.667	1.035	11.042	1.035	0.410	12
53029	21.116	0.870	21.952	0.870	0.506	6
54008	10.750	14.522	14.119	14.421	0.564	34
54010	12.049	2.174	13.518	2.203	0.508	20
54012	36.580	7.175	36.714	7.174	0.681	12
54014	11.041	13.654	8.826	13.640	0.392	6
54016	23.087	2.015	24.810	2.013	0.611	29
54017	15.212	2.053	16.080	2.067	0.496	22
54018	13.971	1.721	15.000	1.735	0.502	28
54019	18.870	2.548	18.723	2.562	0.480	28
54020	27.130	1.643	29.873	1.644	0.654	27
54022	9.375	0.506	9.153	0.529	0.322	37
54025	3.125	1.398	4.459	1.388	0.372	21
54027	30.279	2.396	34.507	2.431	0.862	16
54029	12.362	17.334	13.364	17.460	0.558	20
54034	8.952	0.391	8.956	0.388	0.414	19
54036	13.283	0.633	15.268	0.664	0.529	13
54038	8.609	6.480	9.413	6.428	0.469	17
54040	39.164	1.246	43.749	1.245	0.792	17
54041	44.137	1.751	45.260	1.756	0.710	18
54048	9.970	0.702	11.030	0.741	0.447	9
54052	36.363	0.319	35.590	0.321	0.652	18
54053	9.503	1.010	13.040	1.036	0.569	5
54054	11.382	2.188	13.438	2.186	0.475	5
54065	20.995	1.422	23.205	1.238	0.664	7
54084	16.676	0.335	15.586	0.353	0.582	6
54085	14.529	0.134	13.009	0.142	0.597	5
54087	0.000	0.017	15.157	0.023	0.659	11
54088	22.842	1.108	23.219	1.114	0.593	12
54090	8.666	0.059	8.055	0.058	0.293	16
54091	11.656	0.221	11.921	0.221	0.379	13
54092	8.068	0.195	10.450	0.193	0.325	16
54094	31.556	0.789	34.920	0.695	0.650	8
55002	13.162	45.513	13.343	45.365	0.459	50
55003	13.460	10.688	18.431	10.600	0.629	43
55004	9.896	3.207	8.535	3.184	0.369	46
55005	10.225	6.186	8.749	6.189	0.373	33
55007	12.270	35.881	11.860	35.971	0.409	48
55008	10.255	0.691	9.081	0.691	0.313	38
55009	14.506	6.668	14.526	6.201	0.553	6
55010	10.242	1.649	9.217	1.662	0.310	28
55011	5.228	2.626	5.002	2.589	0.381	24

STN NO	Q95(1)	MEAN FLOW	MAM(7)	MEAN FLOW(M)	BFI	UPYRS
55012	7.407	10.229	7.633	10.136	0.378	24
55013	12.018	2.430	14.026	2.412	0.554	24
55014	17.779	3.923	20.440	3.901	0.656	24
55016	3.462	8.987	4.036	9.018	0.372	22
55017	3.209	0.965	2.707	0.894	0.357	8
55018	12.402	1.228	13.965	1.215	0.493	22
55021	15.788	5.825	18.896	5.614	0.651	21
55022	8.813	1.558	8.379	1.510	0.485	14
55023	16.683	71.072	17.488	70.842	0.546	48
55025	8.350	2.219	10.215	2.229	0.572	20
55026	8.285	6.417	7.525	6.412	0.367	53
55028	14.850	0.750	15.729	0.744	0.491	19
55029	12.019	5.916	13.377	5.862	0.512	42
55031	20.824	0.215	33.743	0.225	0.548	17
55033	8.924	0.481	12.109	0.482	0.501	20
55034	8.227	0.205	7.588	0.203	0.295	16
55035	8.947	0.068	10.383	0.067	0.284	16
56001	17.553	28.544	16.805	28.841	0.493	13
56002	21.034	7.328	22.651	7.405	0.579	33
56003	10.803	1.477	11.965	1.463	0.516	19
56004	16.799	19.585	14.232	18.787	0.457	5
56005	20.833	3.103	22.492	3.115	0.551	24
56006	18.254	6.556	17.692	6.501	0.448	7
56007	9.276	1.023	8.975	1.022	0.373	18
56008	22.471	0.214	21.046	0.213	0.596	7
56012	17.060	2.009	17.002	2.008	0.592	11
56013	9.612	1.897	10.927	1.926	0.457	18
56015	7.464	1.397	7.360	1.526	0.489	7
56017	20.647	1.165	-9.999	-9.999	0.494	1
57004	12.856	4.165	13.478	4.187	0.411	33
57005	18.493	18.615	19.233	18.491	0.471	20
57006	12.918	5.384	14.410	5.298	0.417	20
57007	19.411	6.397	21.512	6.576	0.483	17
57008	14.449	5.441	15.816	5.440	0.503	17
57009	12.779	4.318	12.614	4.317	0.481	15
57010	10.556	1.440	10.502	1.401	0.431	16
57011	7.939	0.322	5.460	0.345	0.354	5
57012	5.356	0.218	4.625	0.218	0.218	5
57015	20.623	3.362	21.464	3.368	0.386	12
58001	14.406	6.377	14.714	6.278	0.477	27
58002	7.698	9.975	8.084	10.139	0.335	12
58005	13.353	3.572	13.855	3.505	0.486	20
58006	10.991	3.027	10.892	3.047	0.353	19
58008	12.683	1.909	12.680	1.881	0.386	19
58009	20.435	1.826	22.102	1.827	0.572	19
58010	6.251	0.516	6.245	0.507	0.244	7
58011	12.995	1.004	17.337	1.012	0.697	14
59001	11.675	11.908	12.018	11.875	0.350	33
59002	13.658	1.999	15.294	2.040	0.423	23
60002	7.783	11.206	8.956	11.217	0.429	29

STN NO	Q95(1)	MEAN FLOW	MAM(7)	MEAN FLOW(M)	BFI	UPYRS
60003	11.511	7.363	12.658	7.292	0.548	25
60004	9.764	1.225	8.745	1.274	0.531	13
60005	4.731	2.232	4.523	2.222	0.357	22
60006	8.421	4.921	8.950	4.893	0.462	22
60007	11.010	8.990	6.737	8.811	0.332	4
60009	12.509	3.166	11.180	3.342	0.335	7
60010	12.695	39.247	14.371	39.110	0.470	14
60012	4.823	0.701	4.166	0.702	0.341	12
60013	8.303	8.750	7.778	9.042	0.430	6
61002	16.604	5.907	16.479	5.645	0.536	12
61003	14.843	1.093	13.013	1.132	0.572	21
62001	10.049	28.437	11.916	28.282	0.533	31
62002	10.606	16.405	10.902	14.188	0.487	11
63001	9.811	5.882	9.466	5.874	0.412	27
63003	8.242	1.050	4.895	1.062	0.418	3
63005	9.466	0.038	16.042	0.035	0.332	5
63006	8.994	0.040	-9.999	-9.999	0.309	5
64001	9.661	22.989	9.201	22.788	0.371	28
64002	11.344	4.441	11.590	4.585	0.482	24
64006	3.682	1.102	12.473	1.106	0.455	30
64007	5.861	0.051	8.379	0.053	0.346	7
64008	5.418	0.147	1.553	0.120	0.258	7
65001	9.488	5.802	8.458	5.748	0.309	29
65004	11.150	2.264	7.258	2.268	0.416	6
65005	14.837	0.613	16.281	0.613	0.535	17
65006	12.063	4.649	11.152	4.672	0.401	14
65007	8.764	2.526	8.563	2.542	0.370	15
66001	15.142	6.103	16.715	6.044	0.592	22
66002	9.873	4.573	9.407	4.388	0.492	14
66004	34.357	0.722	36.816	0.722	0.828	7
66005	5.228	1.166	4.314	1.219	0.584	6
66006	8.379	4.190	9.097	4.180	0.460	17
66011	6.993	18.074	6.067	18.163	0.282	26
67005	14.810	3.003	16.863	3.002	0.540	21
67008	20.093	2.393	20.315	2.394	0.563	25
67009	0.000	1.119	0.000	0.701	0.441	18
67010	9.453	0.626	7.397	0.620	0.258	10
67013	9.052	1.239	9.281	1.212	0.398	10
67016	8.002	0.833	8.727	0.604	0.405	8
67018	7.034	3.088	6.352	3.111	0.273	21
68001	19.922	5.682	24.184	5.577	0.530	53
68003	18.597	5.506	19.281	5.496	0.522	12
68004	32.174	0.804	28.206	0.804	0.588	7
68005	15.256	1.650	17.044	1.661	0.498	37
68006	19.481	2.912	17.425	2.958	0.492	7
68007	9.940	1.865	16.741	1.796	0.545	5
68011	4.081	0.455	4.093	0.383	0.331	8
68015	23.258	0.409	24.590	0.409	0.497	9
68020	22.289	1.246	23.098	1.246	0.457	9
69008	17.843	0.722	26.987	0.601	0.504	3

STN NO	Q95(1)	MEAN FLOW	MAM(7)	MEAN FLOW(M)	BFI	UPYRS
69012	40.273	1.255	40.959	1.254	0.614	5
69013	31.134	0.512	24.963	0.516	0.565	4
69017	19.995	3.886	20.252	3.885	0.510	13
69020	32.750	0.890	31.230	0.890	0.538	14
70002	27.315	3.770	21.735	3.796	0.530	6
70004	25.411	1.937	24.260	1.936	0.418	14
71001	13.365	33.391	12.921	33.300	0.322	30
71004	21.627	8.432	21.229	8.714	0.414	20
71006	8.056	13.434	6.812	13.670	0.287	22
71009	12.267	34.462	11.401	35.551	0.309	10
71010	20.615	2.728	19.151	2.753	0.415	19
71011	6.401	7.769	5.552	7.761	0.252	18
72001	9.263	33.706	9.766	33.685	0.323	18
72002	8.486	6.701	8.900	6.670	0.325	27
72004	8.833	34.891	9.055	34.867	0.319	31
72005	8.824	8.802	8.253	8.744	0.348	21
72007	8.607	0.913	9.381	0.912	0.326	5
72008	9.891	3.393	9.664	3.350	0.309	23
72009	7.487	3.956	7.356	3.955	0.299	9
72011	7.481	9.633	7.036	10.245	0.253	21
72015	7.487	6.351	6.082	6.398	0.339	5
72804	14.066	8.293	12.565	7.386	0.348	7
72811	7.058	0.793	3.506	0.835	0.309	7
72814	9.252	0.293	5.851	0.277	0.237	6
72817	4.721	0.768	3.212	0.689	0.195	4
72818	4.082	0.998	2.433	1.028	0.172	3
72820	0.000	0.024	0.000	0.020	0.290	2
73002	11.918	4.072	11.710	4.057	0.570	27
73003	6.815	3.690	7.632	3.659	0.325	7
73005	13.399	8.559	11.837	8.553	0.456	22
73008	14.193	3.461	13.771	3.492	0.498	21
73009	7.851	1.847	8.122	1.846	0.377	9
73010	8.489	13.867	8.365	13.845	0.503	51
73011	7.807	2.398	6.738	2.342	0.381	18
73013	13.222	4.185	7.917	4.185	0.272	2
74001	8.365	4.961	7.935	4.990	0.279	22
74002	12.160	3.229	11.044	3.227	0.466	23
74003	15.077	2.474	14.499	2.479	0.315	17
74005	15.543	5.161	15.155	5.159	0.392	16
74007	8.260	4.507	7.838	4.506	0.294	14
75002	12.495	25.825	13.125	25.470	0.479	30
75003	11.365	16.395	10.082	16.454	0.499	22
75004	13.065	5.103	11.785	5.098	0.427	23
75006	4.390	1.675	2.566	1.651	0.320	13
75007	9.054	2.268	7.241	2.275	0.294	10
75009	11.658	5.113	10.705	5.197	0.351	19
75010	14.261	0.811	12.734	0.814	0.480	6
75017	11.582	2.394	12.072	2.393	0.491	8
76002	18.773	34.351	18.066	34.051	0.489	24
76004	18.829	3.412	19.695	3.527	0.414	28

STN NO	Q95(1)	MEAN FLOW	MAM(7)	MEAN FLOW(M)	BFI	UPYRS
76005	13.433	14.289	13.096	14.203	0.369	26
76007	19.706	50.304	19.348	49.357	0.501	23
76008	13.635	7.093	13.636	7.102	0.316	23
76009	17.751	4.491	17.332	4.653	0.485	22
76010	14.207	2.060	14.459	2.117	0.461	20
76011	2.661	0.046	1.040	0.046	0.188	23
76014	5.775	2.540	4.851	2.559	0.240	19
76805	4.339	0.144	3.575	0.128	0.265	3
77001	12.866	24.793	12.270	25.185	0.366	27
77002	12.626	16.891	11.866	16.869	0.383	27
77003	10.151	10.252	9.841	10.305	0.321	16
77004	6.975	1.851	6.818	1.825	0.299	11
77005	8.394	5.526	8.444	5.766	0.255	12
78003	11.992	28.275	11.476	28.041	0.430	22
78004	4.732	2.607	4.424	2.605	0.274	23
78005	8.332	8.048	8.420	8.046	0.357	10
78006	9.358	8.972	10.966	8.909	0.417	7
79002	10.130	26.323	10.312	26.286	0.384	33
79003	6.257	5.433	6.313	5.393	0.269	31
79004	5.679	5.387	5.689	5.349	0.313	27
79005	6.405	7.688	6.901	7.627	0.376	27
79006	8.286	16.050	8.005	16.054	0.342	23
80001	4.213	5.825	4.435	5.793	0.355	27
80003	3.763	0.405	3.420	0.397	0.183	10
80004	1.491	0.408	2.028	0.289	0.362	8
80005	5.847	0.161	5.362	0.163	0.292	7
80006	6.508	1.133	5.596	1.131	0.446	7
81002	6.128	15.433	5.152	15.314	0.272	27
81003	4.610	5.947	4.200	5.941	0.227	23
81004	3.757	10.387	3.636	10.391	0.328	13
81005	9.834	0.813	8.661	0.790	0.375	5
81006	5.262	7.694	4.960	7.346	0.262	4
81007	5.434	3.095	3.764	2.744	0.310	2
82001	7.681	6.403	7.808	6.381	0.327	27
82003	3.763	10.605	3.821	10.841	0.297	17
83003	10.431	4.951	10.274	4.902	0.293	20
83004	4.902	5.437	5.354	5.535	0.249	18
83005	5.890	9.346	4.692	9.398	0.264	18
83006	8.666	15.616	8.311	15.766	0.298	14
83007	5.289	1.685	5.010	1.679	0.251	13
83008	6.724	3.342	7.235	3.193	0.299	10
83009	3.201	6.515	3.417	6.513	0.224	12
83010	6.215	3.404	14.071	2.839	0.389	13
84003	20.511	26.059	19.336	26.081	0.504	34
84004	19.587	17.831	19.531	17.840	0.519	33
84005	19.167	40.816	18.315	40.778	0.449	32
84012	13.720	6.719	13.016	6.692	0.355	27
84013	20.889	45.176	19.797	44.928	0.453	27
84014	6.343	7.456	6.418	7.527	0.262	26
84015	17.628	6.574	16.789	6.492	0.428	30

STN NO	Q95(1)	MEAN FLOW	MAM(7)	MEAN FLOW(M)	BFI	UPYRS
84016	15.954	0.858	14.797	0.857	0.395	21
84018	15.794	24.307	15.645	24.291	0.524	21
84020	8.437	1.936	7.382	1.921	0.309	22
84022	14.733	2.970	13.771	3.093	0.443	24
84025	13.522	2.395	13.634	2.381	0.425	15
84026	8.279	1.306	7.672	1.282	0.345	16
84029	7.332	0.549	6.510	0.556	0.283	15
84030	10.794	3.687	9.670	3.761	0.327	9
85001	33.463	40.757	34.275	41.025	0.819	8
85002	8.495	7.075	8.366	6.974	0.312	27
85003	4.354	5.493	3.105	5.501	0.174	20
85004	6.781	2.713	5.004	2.736	0.284	14
87801	5.883	0.313	4.939	0.319	0.140	26
89008	9.205	0.448	6.347	0.437	0.285	9
89009	5.773	0.738	3.130	0.748	0.215	9
89805	6.817	4.928	5.452	4.703	0.207	12
89807	5.997	1.707	5.151	1.749	0.247	9
90002	4.939	4.773	6.078	4.479	0.212	5
90003	8.877	6.617	7.295	6.463	0.269	8
93001	9.451	10.834	7.526	10.832	0.274	11
94001	18.366	28.940	15.294	28.722	0.666	20
95001	22.901	8.415	19.020	8.428	0.650	13
96001	4.985	4.974	5.297	4.973	0.257	14
96002	7.597	15.441	8.396	15.482	0.428	13
96003	7.222	2.573	6.483	2.449	0.271	5
97002	5.938	8.607	7.741	8.605	0.467	18
101005	34.058	0.202	32.394	0.201	0.619	8
101006	19.791	0.148	18.664	0.151	0.683	2
101007	16.775	0.105	13.773	0.109	0.386	8
201002	5.947	5.127	5.737	5.176	0.281	19
201005	14.786	6.655	13.788	6.737	0.455	18
201006	6.704	8.016	7.094	8.039	0.346	18
201007	21.024	3.785	22.976	3.925	0.550	15
201008	4.547	13.519	4.445	13.515	0.335	14
201009	13.707	15.892	14.354	16.216	0.389	10
201010	10.001	54.650	10.341	55.001	0.410	8
202002	13.940	8.274	19.218	8.206	0.497	14
203010	5.665	17.076	5.881	16.974	0.442	20
203011	12.718	5.805	11.249	5.710	0.448	11
203012	19.329	8.650	18.277	8.642	0.513	20
203013	12.427	15.339	12.445	15.259	0.394	20
203017	9.145	5.117	9.364	5.106	0.353	20
203018	14.106	5.971	15.724	5.941	0.527	20
203019	9.577	3.196	10.151	3.247	0.433	18
203020	14.430	8.002	14.716	8.135	0.424	19
203021	6.531	3.233	5.829	3.265	0.316	19
203024	3.503	3.254	4.131	3.294	0.400	19
203025	13.732	2.744	17.898	2.768	0.439	19
203026	10.225	0.754	15.911	0.721	0.436	19
203028	10.652	2.814	10.106	2.804	0.357	18

STN NO	Q95(1)	MEAN FLOW	MAM(7)	MEAN FLOW(M)	BFI	UPYRS
203029	10.278	1.612	10.936	1.617	0.505	17
203033	8.557	2.662	8.054	2.771	0.338	15
203042	8.440	1.067	7.813	1.045	0.359	9
204001	12.401	6.895	13.782	6.969	0.428	18
205003	6.558	7.089	9.490	7.087	0.387	14
205004	10.234	8.929	11.271	9.038	0.451	18
205005	2.431	1.004	2.738	1.011	0.440	18
205006	5.307	4.498	6.461	4.487	0.366	9
205008	3.838	1.835	5.862	1.842	0.345	16
205010	1.440	2.644	1.710	2.630	0.217	16
205020	10.755	0.906	11.734	0.857	0.459	7
206001	5.898	2.294	6.626	2.294	0.502	5
206002	2.494	0.737	6.305	0.737	0.414	14
236005	10.068	6.762	11.306	6.784	0.370	15
236007	6.017	4.550	5.675	4.448	0.529	9

Appendix 3 Calculation of catchment characteristics

LF1 - LF12	Percentage of catchment in low flow HOST group, based on dominant HOST classes within 1 km^2 grid squares
AREA	Catchment area, km^2
SAAR	Standard period (1941-70) average annual rainfall, mm
PE	Potential evaporation, mm
LOSSES	Actual evaporation, mm. Calculated from equation $AE = r \times PE$
r	Adjustment factor for calculation of AE from PE. For SAAR $<=$ 850 mm, $r = 0.00061SAAR + 0.475$ SAAR $>$ 850 mm, $r = 1.0$
FALAKE	Proportion of catchment covered by lake or reservoir

STN NO	LF1	LF2	LF3	LF4	LF5	LF6	LF7	LF8	LF9	LF10	LF11	LF12
2001	0.00	0.00	0.00	0.12	0.00	0.54	2.22	0.00	51.80	43.15	0.00	2.17
3001	0.00	0.00	0.00	0.00	1.78	0.00	8.53	0.00	34.64	46.65	0.00	8.40
3002	0.00	0.00	0.00	0.00	0.21	0.84	36.00	0.00	35.07	27.89	0.00	0.00
3003	0.00	0.00	0.00	0.21	0.45	0.00	8.08	0.00	41.35	48.72	0.00	1.20
3004	0.00	0.00	0.00	0.00	0.79	1.07	10.94	0.00	37.17	48.95	0.00	1.07
3803	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.93	63.58	0.00	1.49
4003	0.00	0.00	0.00	1.49	5.25	0.00	15.89	0.00	27.21	47.15	0.00	3.01
4005	0.00	0.00	0.00	0.00	0.00	2.42	42.55	0.00	25.08	29.15	0.00	0.81
5802	0.00	0.00	0.00	0.00	0.00	0.00	36.40	0.00	37.29	19.61	0.00	6.70
6001	0.00	0.00	2.58	0.46	2.01	1.13	23.59	0.00	33.82	29.90	0.00	6.51
6003	0.00	0.00	1.40	0.00	0.00	0.60	24.07	0.00	38.34	30.58	0.00	5.00
6006	0.00	0.00	0.00	0.00	0.00	0.00	8.04	0.00	28.86	59.10	0.00	4.00
6008	0.00	0.00	0.00	0.00	6.47	0.00	24.67	0.00	41.32	24.74	0.00	2.80
7001	0.00	0.00	1.53	0.00	0.12	3.33	18.62	0.00	14.43	61.73	0.00	0.24
7002	0.00	0.00	6.98	0.00	0.17	2.15	14.81	0.00	26.00	49.51	0.00	0.39
7003	0.00	0.00	21.74	0.00	9.50	7.60	22.54	0.00	14.19	23.55	0.00	0.89
7004	0.00	0.00	20.96	1.71	2.37	4.22	19.10	0.00	18.45	30.99	0.00	2.20
7005	0.00	0.00	3.13	0.00	0.25	0.00	13.62	0.00	40.23	41.52	0.00	1.25
7006	0.00	0.00	4.76	0.00	0.00	0.00	0.00	0.00	2.40	92.84	0.00	0.00
8001	0.00	0.00	9.08	0.41	2.81	3.45	32.76	0.00	23.69	27.42	0.00	0.39
8002	0.00	0.00	6.93	0.00	0.04	4.57	33.33	0.00	24.21	30.62	0.00	0.30
8004	0.00	0.00	1.15	1.28	3.71	0.49	41.57	0.00	19.82	31.62	0.00	0.37
8005	0.00	0.00	10.81	0.00	0.29	4.05	33.98	0.00	23.54	26.70	0.00	0.63
8006	0.00	0.00	8.55	0.38	3.10	3.65	33.78	0.00	23.60	26.59	0.00	0.35
8009	0.00	0.00	5.88	0.00	0.18	2.95	27.98	0.00	30.99	32.02	0.00	0.00
8010	0.00	0.00	11.29	0.23	0.63	4.23	31.67	0.00	25.03	26.47	0.00	0.45
8011	0.00	0.00	0.00	1.92	0.00	0.00	51.03	0.00	23.35	23.70	0.00	0.00
9001	0.00	0.00	3.36	0.00	4.60	0.67	56.74	0.00	13.29	21.34	0.00	0.00
9002	0.00	0.00	2.80	0.00	3.98	3.22	63.92	0.00	13.91	12.17	0.00	0.00
9003	0.00	0.00	0.00	0.00	3.86	5.08	61.70	0.00	19.20	10.17	0.00	0.00
9004	0.00	0.00	4.42	0.00	3.96	0.00	74.73	0.00	9.21	7.68	0.00	0.00
9005	0.00	0.00	0.00	0.00	1.55	0.00	38.31	0.00	18.94	41.20	0.00	0.00
10001	0.00	0.00	2.40	0.00	9.54	1.75	80.45	0.00	5.64	0.22	0.00	0.00
10002	0.00	0.00	5.49	0.00	8.41	2.13	64.71	0.00	8.16	11.10	0.00	0.00
10003	0.00	0.00	2.07	0.00	12.14	1.51	76.60	0.00	7.29	0.38	0.00	0.00
11001	0.00	0.00	3.37	0.00	9.17	4.85	62.58	0.00	15.22	4.80	0.00	0.00
11002	0.00	0.00	3.14	0.00	10.55	3.90	54.03	0.00	20.93	7.46	0.00	0.00
11003	0.00	0.00	2.93	0.00	11.77	2.35	49.63	0.00	22.13	11.19	0.00	0.00
12001	0.00	0.00	4.74	0.07	4.44	1.84	52.60	0.00	21.64	14.24	0.00	0.42
12002	0.00	0.00	5.08	0.05	3.68	2.59	50.80	0.00	21.92	15.55	0.00	0.32

STN NO	AREA	SAAR	PE	LOSSES	r	FALAKE
2001	551.4	1103	375	382	1.02	0.029
3001	494.6	1580	327			0.074
3002	241.1	2034	345	895	2.60	0.002
3003	330.7	1966	342	377	1.10	0.010
3004	187.5	2081	330	876	2.65	0.015
3803	64.2	1318	310			0.006
4003	201.0	1479	339			0.015
4005	120.5	2086	300			0.009
5802	243.5	2255	306			0.060
6001	1792.3	1827	365	526	1.44	0.062
6003	391.0	2148	338	476	1.41	0.043
6006	27.5	1569	379	560	1.48	0.059
6008	105.9	1338	386	432	1.12	0.016
7001	415.6	1436	305	426	1.40	0.002
7002	781.9	1208	343	457	1.33	0.005
7003	216.0	888	421	506	1.20	0.002
7004	313.0	1063	370	495	1.34	0.018
7005	165.0	922	386	363	0.94	0.012
7006	20.0	962	389			0.006
8001	2654.7	1196	311	527	1.69	0.004
8002	1011.7	1341	297	679	2.29	0.008
8004	542.8	1236	307	387	1.26	0.002
8005	1267.8	1305	298	605	2.03	0.012
8006	2861.2	1184	316	476	1.51	0.000
8009	272.2	1061	307	379	1.23	0.000
8010	1748.8	1236	301	573	1.90	0.000
8011	104.0	1142	306	455	1.49	0.000
9001	441.6	1078	348	437	1.26	0.000
9002	954.9	994	390	449	1.15	0.000
9003	176.1	958	414	486	1.17	0.000
9004	179.0	1047	353	493	1.40	0.000
9005	67.0	1179	307	438	1.43	0.000
10001	448.1	862	437	389	0.89	0.001
10002	325.0	876	445	431	0.97	0.000
10003	523.0	858	437	403	0.92	0.000
11001	1273.0	964	371	464	1.25	0.000
11002	787.0	1026	347	459	1.32	0.000
11003	499.0	1081	323	427	1.32	0.000
12001	1370.0	1194	308	358	1.16	0.005
12002	1844.0	1163	329	380	1.16	0.000

STN NO	LF1	LF2	LF3	LF4	LF5	LF6	LF7	LF8	LF9	LF10	LF11	LF12
12003	0.00	0.00	2.84	0.14	3.34	1.30	53.72	0.00	21.78	16.59	0.00	0.28
12004	0.00	0.00	0.00	0.00	7.61	0.00	25.10	0.00	51.94	15.34	0.00	0.00
12005	0.00	0.00	0.58	0.00	5.78	0.25	39.21	0.00	24.39	28.13	0.00	1.67
12006	0.00	0.00	1.44	0.00	3.05	0.62	43.63	0.00	29.30	21.96	0.00	0.00
12007	0.00	0.00	0.48	0.00	1.51	0.20	60.32	0.00	16.79	20.37	0.00	0.34
12008	0.00	0.00	4.69	0.00	0.21	3.27	23.63	0.00	34.73	33.47	0.00	0.00
13001	0.00	0.00	6.45	0.00	0.00	4.03	75.01	0.00	10.48	4.03	0.00	0.00
13002	0.00	0.00	1.45	0.00	0.00	7.25	77.53	0.00	10.87	2.90	0.00	0.00
13003	0.00	0.00	5.18	0.00	0.92	4.55	67.95	0.00	11.08	10.33	0.00	0.00
13004	0.00	0.00	1.89	0.00	0.00	0.00	66.72	0.00	21.05	10.34	0.00	0.00
13005	0.00	0.00	10.08	0.00	0.00	3.88	85.26	0.00	0.00	0.00	0.00	0.78
13007	0.00	0.00	6.36	0.00	0.00	4.49	50.29	0.00	23.50	15.24	0.00	0.13
13008	0.00	0.00	5.30	0.00	0.91	4.49	68.21	0.00	10.91	10.18	0.00	0.00
13009	0.00	0.00	3.03	0.00	0.00	1.52	40.09	0.00	37.12	18.25	0.00	0.00
14001	0.00	0.00	15.76	0.27	4.13	7.54	71.32	0.00	0.97	0.00	0.00	0.00
14002	0.00	0.00	0.00	0.00	5.59	6.45	87.15	0.00	0.00	0.00	0.00	0.81
15001	0.00	0.00	3.89	0.00	0.00	1.67	47.49	0.00	19.39	27.56	0.00	0.00
15002	0.00	0.00	0.00	0.00	0.00	0.00	69.77	0.00	12.76	17.46	0.00	0.00
15004	0.00	0.00	10.77	0.00	0.00	4.62	59.23	0.00	25.38	0.00	0.00	0.00
15005	0.00	0.00	1.59	0.00	0.00	0.68	55.06	0.00	29.17	11.23	0.00	2.27
15008	0.00	0.00	13.56	1.13	4.19	8.47	72.65	0.00	0.00	0.00	0.00	0.00
15010	0.00	0.00	10.11	0.55	0.83	2.59	62.08	0.00	13.43	9.84	0.00	0.56
15013	0.00	0.00	6.17	0.00	0.00	0.68	51.49	0.00	15.43	26.22	0.00	0.00
15021	0.00	0.00	15.31	0.00	0.00	3.06	69.07	0.00	8.99	0.50	0.00	3.06
15023	0.00	0.00	2.66	0.00	0.00	1.14	53.18	0.00	27.93	13.66	0.00	1.43
15024	0.00	0.00	2.13	0.00	0.00	2.21	32.27	0.00	33.40	29.99	0.00	0.00
15025	0.00	0.00	5.46	2.44	0.00	2.57	52.42	0.00	23.41	13.72	0.00	0.00
16001	0.00	0.00	4.48	3.04	1.16	5.65	52.00	0.00	12.89	18.58	0.00	2.20
16003	0.00	0.00	0.00	0.00	5.45	2.00	45.09	0.00	6.55	40.91	0.00	0.00
17004	0.00	0.00	0.00	0.00	0.00	1.27	96.83	0.00	0.00	1.90	0.00	0.00
17005	0.00	0.00	7.98	0.90	0.16	1.06	76.60	0.00	4.84	7.40	0.00	1.06
17008	0.00	0.00	20.59	0.00	0.00	8.82	61.77	0.00	8.82	0.00	0.00	0.00
17015	0.00	0.00	4.00	0.00	2.02	0.00	65.98	0.00	28.00	0.00	0.00	0.00
17017	0.00	0.00	15.56	0.00	11.22	6.67	66.55	0.00	0.00	0.00	0.00	0.00
18001	0.00	0.00	12.90	3.23	4.15	6.45	32.62	0.00	13.56	26.44	0.00	0.65
18002	0.00	0.00	7.57	0.00	0.00	5.94	57.29	0.00	18.38	9.73	0.00	1.08
18005	0.00	0.00	12.08	2.42	3.35	4.83	41.58	0.00	13.03	22.22	0.00	0.48
18008	0.00	0.00	0.00	0.00	0.00	3.14	54.57	0.00	27.16	13.56	0.00	1.57
18010	0.00	0.00	2.31	2.06	2.33	1.03	58.40	0.00	10.60	21.46	0.00	1.80
18012	0.00	0.00	9.30	0.00	0.00	0.00	39.53	0.00	0.00	51.17	0.00	0.00

STN NO	AREA	SAAR	PE	LOSSES	r	FALAKE
12003	690.0	1345	294	308	1.05	0.001
12004	30.3	1103	301	590	1.96	0.000
12005	110.0	1339	297	296	1.00	0.020
12006	150.0	1035	297	197	0.66	0.000
12007	289.0	1498	290	138	0.48	0.001
12008	229.0	1185	382			0.000
13001	123.0	929	427	366	0.86	0.000
13002	138.0	916	425	376	0.88	0.001
13003	487.0	1134	369			0.001
13004	104.0	1230	331			0.000
13005	124.0	811	458	378	0.83	0.008
13007	730.0	1098	382	248	0.65	0.001
13008	490.0	1129	370	349	0.94	0.001
13009	127.2	1134	372			0.000
14001	307.4	830	453	438	0.97	0.002
14002	126.9	836	450	453	1.01	0.000
15001	70.7	1470	299	263	0.88	0.000
15002	15.4	1240	313	251	0.80	0.000
15004	24.7	1096	355	387	1.09	0.000
15005	40.9	1146	329	375	1.14	0.046
15008	177.1	874	453	410	0.91	0.000
15010	366.5	1120	355	466	1.31	0.004
15013	174.8	1463	356	524	1.47	0.011
15021	94.0	908	418			0.033
15023	210.0	1488	361	423	1.17	0.011
15024	239.0	2402	301	314	1.04	0.003
15025	432.0	1242	319			0.001
16001	590.5	1521	364	407	1.12	0.024
16003	99.5	1932	355	379	1.07	0.000
17004	162.0	888	454	494	1.09	0.011
17005	195.3	991	450	388	0.86	0.005
17008	33.7	1115	417			0.000
17015	23.1	1177	404			0.000
17017	7.9	998	436			0.000
18001	161.0	1331	413	363	0.88	0.002
18002	181.0	1387	412	671	1.63	0.006
18005	210.0	1287	418	341	0.82	0.002
18008	190.0	2260	313	204	0.65	0.029
18010	397.0	1587	426			0.012
18012	48.0	1332	428			0.003

STN NO	LF1	LF2	LF3	LF4	LF5	LF6	LF7	LF8	LF9	LF10	LF11	LF12
18014	0.00	0.00	0.00	0.00	0.00	0.00	80.00	0.00	13.60	6.40	0.00	0.00
18016	0.00	0.00	0.00	0.00	25.25	0.00	24.75	0.00	25.25	24.75	0.00	0.00
18017	0.00	0.00	0.00	0.00	0.00	0.00	18.56	0.00	50.51	30.93	0.00	0.00
18018	0.00	0.00	0.00	0.00	0.00	0.00	78.33	0.00	13.42	8.25	0.00	0.00
18019	0.00	0.00	0.00	0.00	0.00	0.00	50.00	0.00	25.25	24.75	0.00	0.00
19002	0.00	0.00	0.00	0.00	0.00	0.00	67.39	0.00	12.08	20.53	0.00	0.00
19003	0.00	0.00	0.00	1.61	0.28	0.00	39.62	0.00	29.54	28.95	0.00	0.00
19004	0.00	0.00	25.06	0.00	0.63	5.32	40.77	0.00	12.04	16.18	0.00	0.00
19007	0.00	0.00	24.96	0.00	2.78	2.06	53.72	0.00	6.44	8.79	0.00	1.25
19008	0.00	0.00	26.86	0.00	7.07	2.14	42.84	0.00	6.34	11.18	0.00	3.57
19011	0.00	0.00	26.42	0.00	0.39	3.28	47.17	0.00	10.56	12.18	0.00	0.00
19014	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00
19017	0.00	0.00	7.57	0.00	0.00	3.24	89.19	0.00	0.00	0.00	0.00	0.00
19811	0.00	0.00	0.00	0.00	0.00	0.00	58.07	0.00	14.66	27.27	0.00	0.00
20001	0.00	0.00	13.28	0.00	3.06	3.97	75.37	0.00	2.04	2.28	0.00	0.00
20003	0.00	0.00	16.50	0.00	4.64	6.00	68.81	0.00	1.55	2.50	0.00	0.00
20005	0.00	0.00	16.94	0.00	6.06	5.51	64.88	0.00	2.53	4.08	0.00	0.00
20006	0.00	0.00	16.00	0.00	0.99	0.00	75.63	0.00	7.38	0.00	0.00	0.00
20007	0.00	0.00	21.21	0.00	3.00	0.00	65.50	0.00	5.74	4.55	0.00	0.00
20008	0.00	0.00	5.00	0.00	0.00	0.00	90.00	0.00	1.25	3.75	0.00	0.00
20806	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00
20807	0.00	0.00	30.00	0.00	0.00	0.00	70.00	0.00	0.00	0.00	0.00	0.00
20808	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00
21001	0.00	0.00	0.00	0.00	0.00	0.00	30.15	0.00	48.60	11.25	0.00	10.00
21002	0.00	0.00	0.00	0.00	0.00	0.00	26.11	0.00	55.51	14.29	0.00	4.08
21003	0.00	0.00	7.37	0.00	0.72	3.84	52.27	0.00	29.89	5.04	0.00	0.88
21005	0.00	0.00	5.83	0.00	0.40	4.43	49.21	0.00	36.18	2.86	0.00	1.08
21006	0.00	0.00	4.60	0.00	0.96	4.02	52.79	0.00	29.48	7.35	0.00	0.80
21007	0.00	0.00	1.82	0.00	0.10	3.98	46.13	0.00	35.74	11.04	0.00	1.20
21008	0.00	0.00	2.78	0.00	0.22	2.69	71.54	0.00	14.25	8.35	0.00	0.18
21009	0.00	0.00	6.13	0.94	1.79	4.44	63.01	0.00	16.18	7.19	0.00	0.32
21010	0.00	0.00	4.15	0.00	2.84	3.55	58.52	0.00	22.91	7.46	0.00	0.58
21011	0.00	0.00	3.04	0.00	0.00	4.34	45.09	0.00	31.38	13.97	0.00	2.17
21012	0.00	0.00	0.00	0.00	0.30	3.03	59.89	0.00	27.96	8.51	0.00	0.30
21013	0.00	0.00	0.00	0.00	2.17	2.44	74.37	0.00	11.75	9.27	0.00	0.00
21014	0.00	0.00	0.00	0.00	0.00	1.46	27.63	0.00	61.50	6.50	0.00	2.92
21015	0.00	0.00	1.92	0.00	6.26	2.04	74.49	0.00	5.17	10.13	0.00	0.00
21016	0.00	0.00	4.92	0.00	9.73	0.82	71.83	0.00	12.70	0.00	0.00	0.00
21017	0.00	0.00	0.00	0.00	0.00	0.00	27.76	0.00	66.36	5.88	0.00	0.00
21018	0.00	0.00	9.07	0.00	0.00	2.91	56.11	0.00	25.41	5.34	0.00	1.16

STN NO	AREA	SAAR	PE	LOSSES	r	FALAKE
18014	23.7	1307	456			0.017
18016	2.8	1934	399			0.000
18017	7.7	2335	298	205	0.69	0.000
18018	6.9	2176	302			0.000
18019	0.9	2623	402			0.000
19002	43.8	1024	448	343	0.77	0.000
19003	51.8	1031	447	584	1.31	0.000
19004	81.6	969	440	395	0.90	0.006
19007	330.0	850	443	472	1.07	0.009
19008	112.0	884	438	507	1.16	0.019
19011	137.0	919	443	445	1.00	0.005
19014	34.1	834	450			0.000
19017	38.8	766	450			0.000
19811	30.3	1054	448			0.000
20001	307.0	736	449	452	1.01	0.000
20003	161.0	761	448	496	1.11	0.000
20005	93.0	797	447	480	1.07	0.001
20006	51.8	743	450	398	0.89	0.003
20007	64.0	797	449	449	1.00	0.002
20008	19.7	738	451			0.013
20806	7.1	637	453			0.000
20807	10.0	792	450			0.000
20808	3.9	638	454			0.000
21001	23.7	1741	395			0.000
21002	45.6	990	447			0.000
21003	694.0	1199	406	520	1.28	0.005
21005	373.0	1309	399	564	1.41	0.008
21006	1500.0	1234	404	492	1.22	0.005
21007	499.0	1412	398	480	1.21	0.006
21008	1110.0	1010	418	457	1.09	0.002
21009	4390.0	1009	420	454	1.08	0.002
21010	2080.0	1140	414	490	1.18	0.000
21011	231.0	1387	394	471	1.19	0.013
21012	323.0	1209	404	392	0.97	0.001
21013	207.0	994	431	451	1.05	0.000
21014	139.0	1619	395	733	1.86	0.022
21015	239.0	893	443	441	1.00	0.000
21016	119.0	747	450	408	0.91	0.000
21017	37.5	1935	392	412	1.05	0.000
21018	175.0	1007	420	490	1.17	0.009

STN NO	LF1	LF2	LF3	LF4	LF5	LF6	LF7	LF8	LF9	LF10	LF11	LF12
21019	0.00	0.00	4.45	0.00	0.79	1.90	44.80	0.00	38.54	9.52	0.00	0.00
21020	0.00	0.00	0.00	0.00	0.00	4.55	31.11	0.00	40.26	20.84	0.00	3.25
21021	0.00	0.00	3.82	0.00	2.16	3.50	63.58	0.00	19.08	7.44	0.00	0.42
21022	0.00	0.00	7.74	0.00	0.30	0.99	60.48	0.00	21.09	9.01	0.00	0.40
21023	0.00	0.00	0.00	0.00	0.00	0.88	99.12	0.00	0.00	0.00	0.00	0.00
21024	0.00	0.00	0.00	0.00	0.00	2.17	63.40	0.00	11.23	23.19	0.00	0.00
21025	0.00	0.00	0.00	0.00	0.86	1.73	69.96	0.00	11.58	15.29	0.00	0.58
21026	0.00	0.00	0.00	0.00	0.00	0.00	18.91	0.00	57.60	23.48	0.00	0.00
21027	0.00	0.00	8.44	0.00	0.00	0.00	70.70	0.00	15.05	5.81	0.00	0.00
21028	0.00	0.00	0.00	0.00	0.00	0.00	16.67	0.00	83.33	0.00	0.00	0.00
21030	0.00	0.00	0.00	0.00	0.00	7.14	25.37	0.00	48.56	18.93	0.00	0.00
21031	0.00	0.00	16.50	6.36	0.22	9.47	47.03	0.00	10.99	9.44	0.00	0.00
21032	0.00	0.00	6.94	5.51	0.00	4.95	60.48	0.00	10.40	11.72	0.00	0.00
21034	0.00	0.00	0.00	0.00	0.00	5.22	29.66	0.00	38.08	22.69	0.00	4.35
21805	0.00	0.00	3.20	0.00	0.53	1.07	51.60	0.00	29.57	13.33	0.00	0.71
22001	0.00	0.00	3.25	8.09	0.46	4.89	55.14	0.00	11.33	16.84	0.00	0.00
22002	0.00	0.00	0.00	12.59	0.00	0.00	47.02	0.00	12.27	28.11	0.00	0.00
22003	0.00	0.00	0.00	1.14	0.00	0.00	16.86	0.00	20.25	61.75	0.00	0.00
22004	0.00	0.00	5.46	10.06	0.32	3.55	62.87	0.00	7.17	10.08	0.49	0.00
22006	0.00	0.00	0.00	0.61	0.25	3.00	93.89	0.00	0.00	0.00	2.25	0.00
22007	0.00	0.00	1.58	1.71	0.47	3.15	69.75	0.00	2.01	20.98	0.35	0.00
22008	0.00	0.00	0.00	5.10	0.00	0.00	46.09	0.00	4.91	43.90	0.00	0.00
22009	0.00	0.00	0.86	9.91	0.57	6.01	44.40	0.00	14.84	23.42	0.00	0.00
23001	0.00	0.00	2.52	1.24	0.29	6.65	34.48	0.00	2.86	50.94	0.14	0.78
23002	0.00	0.00	0.63	3.01	0.56	4.13	32.77	0.00	8.19	46.51	0.00	4.20
23003	0.00	0.00	1.65	1.28	0.00	9.01	15.55	0.00	5.41	65.41	0.00	1.48
23004	0.00	0.00	2.31	0.47	0.26	4.57	39.95	0.00	0.32	51.99	0.00	0.13
23005	0.00	0.00	0.00	0.83	0.00	5.90	5.53	0.00	3.14	79.66	0.00	4.93
23006	0.00	0.00	0.23	0.51	0.41	2.91	26.39	0.00	0.00	69.54	0.00	0.00
23007	0.00	0.00	1.82	1.94	0.40	3.16	52.83	0.00	4.91	27.68	5.24	2.02
23008	0.00	0.00	0.29	2.02	0.00	9.97	17.81	0.00	8.76	60.30	0.00	0.29
23010	0.00	0.00	0.77	2.32	0.00	9.19	2.06	0.00	10.05	75.61	0.00	0.00
23011	0.00	0.00	0.00	1.27	0.00	2.82	3.39	0.00	5.51	87.01	0.00	0.00
23014	0.00	0.00	0.00	1.21	0.00	3.23	8.60	0.00	5.24	81.72	0.00	0.00
24001	0.00	0.13	0.92	2.62	1.89	3.25	53.14	0.00	2.93	31.65	3.46	0.00
24002	0.00	0.94	1.58	1.51	0.11	1.00	85.44	0.00	0.42	4.79	4.21	0.00
24003	0.00	0.00	1.05	0.33	4.56	3.70	26.55	0.00	1.42	62.38	0.00	0.00
24004	0.00	0.00	0.00	14.12	0.00	3.15	33.12	0.00	10.87	38.74	0.00	0.00
24006	0.00	0.00	0.41	1.52	1.76	4.50	14.05	0.00	6.59	71.18	0.00	0.00
24007	0.00	0.00	0.00	0.00	0.00	0.97	91.30	0.00	0.00	7.73	0.00	0.00

STN NO	AREA	SAAR	PE	LOSSES	r	FALAKE
21019	61.6	1450	397	656	1.65	0.000
21020	155.0	1544	392	506	1.29	0.019
21021	3330.0	1078	417	497	1.19	0.003
21022	503.0	860	448	463	1.03	0.010
21023	113.0	714	451	473	1.05	0.000
21024	139.0	973	413	456	1.10	0.000
21025	174.0	998	426	530	1.25	0.009
21026	31.0	1817	394	479	1.22	0.000
21027	159.0	807	448	457	1.02	0.002
21028	5.7	1439	393			0.000
21030	56.2	1637	393	512	1.30	0.000
21031	648.0	848	417	435	1.04	0.000
21032	198.9	927	414	479	1.16	0.001
21034	116.0	1596	392	577	1.47	0.055
21805	277.0	918	448	364	0.81	0.007
22001	569.8	884	421	405	0.96	0.002
22002	59.5	1071	396	429	1.08	0.000
22003	21.4	1050	395	220	0.56	0.000
22004	205.0	756	431	407	0.95	0.000
22006	269.4	725	458	474	1.03	0.001
22007	287.3	847	442	489	1.11	0.005
22008	27.7	1001	397	411	1.04	0.000
22009	346.0	951	404	441	1.09	0.000
23001	2175.6	1082	413	454	1.10	0.002
23002	118.0	962	413	441	1.07	0.000
23003	1007.5	1093	410	470	1.15	0.001
23004	751.1	1234	401	506	1.26	0.002
23005	284.9	1322	400	443	1.11	0.043
23006	321.9	1464	382	427	1.12	0.000
23007	242.1	868	429			0.001
23008	343.8	1022	407	481	1.18	0.002
23010	96.0	1063	403	488	1.21	0.000
23011	58.8	1401	397	403	1.01	0.000
23014	27.0	1399	397	447	1.13	0.000
24001	657.8	969	432	431	1.00	0.002
24002	93.0	789	467	479	1.03	0.000
24003	171.9	1316	395	650	1.64	0.002
24004	74.9	950	435	433	0.99	0.000
24006	36.5	1221	401	534	1.33	0.000
24007	44.6	797	441	405	0.92	0.000

STN NO	LF1	LF2	LF3	LF4	LF5	LF6	LF7	LF8	LF9	LF10	LF11	LF12
24008	0.00	0.00	1.02	3.52	2.75	4.10	38.15	0.00	4.18	45.17	1.10	0.00
25002	0.00	0.00	2.60	0.88	0.00	1.57	15.06	0.00	0.35	78.19	0.00	1.36
25003	0.00	0.00	0.00	0.00	0.00	0.93	0.00	0.00	0.00	99.07	0.00	0.00
25006	0.00	0.00	0.00	1.33	0.51	1.92	21.84	0.00	0.46	73.95	0.00	0.00
25007	0.00	0.00	15.36	1.34	7.93	10.55	61.61	0.00	0.00	3.21	0.00	0.00
25011	0.00	0.00	0.00	0.00	0.00	0.85	0.00	0.00	0.00	99.15	0.00	0.00
25012	0.00	0.00	0.00	0.00	0.00	2.67	32.00	0.00	0.00	65.33	0.00	0.00
25013	0.00	0.00	0.00	0.00	0.00	2.12	96.27	0.00	0.00	0.00	1.61	0.00
25019	0.00	0.00	30.77	0.00	0.00	0.00	11.11	4.27	15.38	38.46	0.00	0.00
25024	0.00	0.00	0.00	0.00	0.00	0.00	69.63	3.71	6.67	6.67	13.33	0.00
25025	0.00	0.00	0.00	0.00	0.00	4.44	0.00	0.00	0.00	95.56	0.00	0.00
25026	0.00	0.00	37.50	0.00	0.00	12.50	50.00	0.00	0.00	0.00	0.00	0.00
25027	0.00	0.00	0.00	0.00	0.00	7.41	0.00	0.00	0.00	92.59	0.00	0.00
25028	0.00	0.00	0.00	0.00	0.00	3.17	0.00	0.00	0.00	96.83	0.00	0.00
26003	77.53	0.00	2.59	0.00	10.31	1.64	7.94	0.00	0.00	0.00	0.00	0.00
26004	85.24	0.00	1.35	0.00	11.72	0.00	1.31	0.00	0.00	0.00	0.39	0.00
26005	86.25	0.00	1.35	0.00	11.72	0.00	0.68	0.00	0.00	0.00	0.00	0.00
26007	0.00	0.00	1.56	0.00	0.00	10.94	87.50	0.00	0.00	0.00	0.00	0.00
27002	0.00	1.90	2.48	8.18	1.13	5.67	29.54	0.00	11.24	37.36	1.98	0.52
27007	0.00	0.39	6.20	2.50	13.36	7.58	30.00	0.00	6.46	32.85	0.66	0.00
27008	0.00	0.79	7.18	2.53	7.39	10.70	45.10	0.16	4.98	20.01	1.10	0.07
27009	0.00	0.83	6.78	3.30	8.82	11.01	42.28	0.08	4.65	20.82	1.35	0.06
27010	0.00	0.00	0.83	0.00	3.61	0.00	20.25	3.09	5.56	66.66	0.00	0.00
27015	4.26	11.24	5.67	12.83	5.65	12.17	21.42	6.66	9.04	10.75	0.30	0.00
27023	0.00	0.00	0.00	20.91	10.45	0.85	49.15	0.00	0.00	0.00	18.64	0.00
27024	0.00	0.00	0.77	6.58	5.18	4.38	9.71	0.00	14.71	58.68	0.00	0.00
27027	0.00	0.00	3.90	9.14	0.59	5.43	10.24	0.00	15.53	54.50	0.45	0.22
27032	0.00	0.00	0.00	0.00	0.00	3.03	0.00	0.00	0.00	96.97	0.00	0.00
27033	0.00	0.00	2.27	8.08	4.04	0.38	73.11	0.00	0.00	0.00	12.12	0.00
27034	0.00	0.00	2.97	3.12	12.38	7.55	17.43	0.00	8.68	47.88	0.00	0.00
27035	0.00	0.00	0.42	5.63	6.87	6.24	42.75	0.00	12.18	25.91	0.00	0.00
27038	0.00	22.50	0.00	35.83	16.67	0.00	12.50	0.00	0.00	0.00	12.50	0.00
27040	0.00	16.62	0.00	5.88	1.95	0.00	65.55	0.00	0.00	0.00	10.00	0.00
27041	3.79	11.54	5.82	13.15	5.73	12.23	20.60	6.52	9.27	11.03	0.31	0.00
27042	0.00	2.91	1.21	11.83	9.55	0.00	22.22	5.19	13.23	33.87	0.00	0.00
27043	0.00	0.00	4.06	9.26	0.61	4.87	8.97	0.00	15.97	56.03	0.00	0.23
27044	17.08	0.00	0.29	0.00	1.68	15.75	54.79	10.42	0.00	0.00	0.00	0.00
27047	0.00	0.00	0.00	6.49	0.00	4.44	10.00	0.00	13.51	65.56	0.00	0.00
27049	0.00	24.68	0.00	11.51	2.39	5.07	19.78	6.38	9.52	20.67	0.00	0.00
27050	0.00	0.00	4.07	1.25	0.22	0.60	33.41	5.39	8.90	46.16	0.00	0.00

STN NO	AREA	SAAR	PE	LOSSES	r	FALAKE
24008	455.0	1070	418	538	1.29	0.002
25002	217.3	1758	388	642	1.66	0.000
25003	11.4	2024	360	497	1.38	0.000
25006	86.1	1259	416	432	1.04	0.000
25007	78.2	757	485	454	0.94	0.002
25011	13.0	1457	397	443	1.12	0.000
25012	25.1	1735	387	506	1.31	0.000
25013	61.4	647	499			0.000
25019	14.8	858	462	432	0.93	0.000
25024	13.4	778	483			0.000
25025	8.6	1317	419			0.000
25026	4.9	858	445			0.000
25027	2.2	1289	417			0.000
25028	11.7	1280	398			0.000
26003	57.2	724	475	354	0.74	0.000
26004	253.8	749	468			0.000
26005	240.0	751	468			0.000
26007	15.5	625	488	415	0.85	0.000
27002	758.9	1168	451	428	0.95	0.007
27007	914.6	1118	449	405	0.90	0.002
27008	1345.6	877	455	393	0.86	0.000
27009	3315.0	918	457	451	0.99	0.001
27010	18.9	1038	448	462	1.03	0.000
27015	1634.3	782	462	465	1.01	0.000
27023	118.9	765	464	383	0.83	0.000
27024	381.0	1302	425	438	1.03	0.000
27027	443.0	1381	445	399	0.90	0.002
27032	22.2	1453	449	205	2.68	0.005
27033	33.2	763	475			0.000
27034	510.2	1346	432	398	0.92	0.000
27035	282.3	1134	461	444	0.96	0.004
27038	7.8	725	453			0.000
27040	67.9	716	489	394	0.81	0.007
27041	1586.0	784	461	444	0.96	0.000
27042	59.2	957	451	375	0.83	0.000
27043	427.0	1400	445	310	0.70	0.005
27044	47.0	681	488	409	0.84	0.000
27047	10.2	1780	407	58	0.14	0.000
27049	238.7	879	454	394	0.87	0.000
27050	308.0	907	459	458	1.00	0.000

STN NO	LF1	LF2	LF3	LF4	LF5	LF6	LF7	LF8	LF9	LF10	LF11	LF12
27051	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00
27052	0.00	0.00	0.58	26.05	5.07	0.00	50.99	0.00	0.00	0.00	17.31	0.00
27054	0.00	0.00	0.43	1.72	1.86	0.00	25.97	3.18	15.43	51.42	0.00	0.00
27055	0.00	5.50	0.00	7.13	0.51	0.00	31.21	8.48	10.53	36.64	0.00	0.00
27056	0.00	20.15	4.64	32.37	7.96	0.00	2.99	0.00	25.92	5.97	0.00	0.00
27057	0.00	5.12	1.27	8.92	2.71	1.63	22.22	7.05	17.76	33.33	0.00	0.00
27058	0.00	15.36	0.37	13.06	4.84	3.42	5.48	11.11	34.18	12.20	0.00	0.00
27059	0.00	0.00	5.63	3.80	4.98	4.14	55.96	0.00	5.78	17.22	2.50	0.00
27060	0.00	0.00	11.32	0.79	0.71	37.76	49.09	0.33	0.00	0.00	0.00	0.00
27064	0.00	21.35	0.51	19.10	7.76	1.59	37.20	0.00	0.00	0.00	12.50	0.00
27066	0.00	0.00	0.00	13.59	6.35	0.00	14.29	0.00	3.87	0.00	61.90	0.00
27067	0.00	0.00	0.00	7.62	1.42	1.18	23.28	0.00	1.73	9.46	55.31	0.00
27069	0.00	0.00	3.46	0.32	0.57	7.39	85.79	0.54	0.00	0.00	1.93	0.00
27070	0.00	0.00	0.00	1.70	5.45	1.35	49.09	0.00	7.39	35.02	0.00	0.00
27071	0.00	0.79	7.16	2.53	7.38	10.80	45.07	0.16	4.97	19.98	1.10	0.07
27072	0.00	0.00	0.00	10.36	1.37	3.65	17.81	0.00	3.34	47.03	16.44	0.00
27073	0.00	55.39	19.85	6.15	0.00	15.18	0.00	0.00	3.42	0.00	0.00	0.00
27075	0.00	1.10	8.33	0.00	26.22	16.03	47.23	0.00	0.00	1.09	0.00	0.00
27076	52.07	0.00	3.68	0.00	5.34	21.57	1.60	15.74	0.00	0.00	0.00	0.00
27077	0.00	0.00	0.00	7.14	0.60	0.00	13.69	0.00	0.00	0.00	78.57	0.00
27083	0.00	0.00	1.14	5.13	2.56	33.04	48.73	7.69	0.00	0.00	1.71	0.00
28003	0.00	0.00	3.52	0.11	0.09	2.45	9.98	0.00	0.00	0.00	83.86	0.00
28008	0.00	0.00	3.86	45.66	0.34	2.22	35.29	0.51	5.50	6.63	0.00	0.00
28009	0.00	0.90	9.06	9.85	0.86	8.99	48.64	2.33	1.81	1.99	15.42	0.14
28010	0.00	0.00	0.69	40.15	3.19	1.84	31.47	0.00	10.41	8.68	3.39	0.18
28011	0.00	0.00	0.65	44.95	2.94	1.65	18.54	0.00	15.62	13.20	2.31	0.14
28014	0.00	0.00	20.61	1.53	0.00	13.79	55.67	0.00	0.00	0.00	8.41	0.00
28018	0.00	0.00	9.73	24.41	0.23	8.66	46.48	0.46	2.86	6.03	1.14	0.00
28020	0.00	0.00	17.57	10.61	0.00	1.20	55.02	0.00	1.51	11.54	2.55	0.00
28022	0.00	1.21	9.10	8.95	0.85	9.99	47.44	4.52	1.64	1.80	14.35	0.16
28024	0.00	10.89	1.08	0.00	0.00	3.24	55.54	27.32	0.00	0.00	1.92	0.00
28025	0.00	0.00	5.97	0.17	0.20	5.84	84.33	0.00	0.00	0.00	3.48	0.00
28029	0.00	0.00	0.00	0.00	0.00	0.00	85.97	14.03	0.00	0.00	0.00	0.00
28030	0.00	0.00	0.00	0.00	0.00	1.48	98.52	0.00	0.00	0.00	0.00	0.00
28031	0.00	0.00	0.00	32.74	0.88	0.52	40.79	1.32	6.39	17.36	0.00	0.00
28033	0.00	0.00	0.00	31.97	0.00	0.00	26.47	0.00	41.56	0.00	0.00	0.00
28035	0.00	11.45	27.58	0.00	1.72	2.03	8.42	0.00	0.00	0.00	48.80	0.00
28038	0.00	0.00	0.00	24.05	2.90	0.00	46.41	4.35	7.07	15.22	0.00	0.00
28040	0.00	0.00	1.37	9.91	0.00	0.00	59.10	0.00	0.77	5.77	23.08	0.00
28041	0.00	0.00	0.00	2.56	0.00	1.99	53.85	0.00	0.00	41.60	0.00	0.00

STN NO	AREA	SAAR	PE	LOSSES	r	FALAKE
27051	8.1	866	458	434	0.95	0.000
27052	50.2	825	465	289	0.62	0.000
27054	37.1	990	449	414	0.92	0.000
27055	131.7	940	450	391	0.87	0.000
27056	68.6	838	453	440	0.97	0.000
27057	121.6	902	451	436	0.97	0.000
27058	57.6	847	454	595	1.31	0.000
27059	87.5	886	475	496	1.04	0.002
27060	167.6	637	471			0.000
27064	83.7	621	488	383	0.78	0.002
27066	42.8	740	469	548	1.17	0.000
27067	49.1	861	460	477	1.04	0.000
27069	215.5	652	469			0.000
27070	35.3	1027	453			0.003
27071	1363.0	877	455	414	0.91	0.000
27072	71.7	1224	468			0.010
27073	12.9	728	459			0.000
27075	160.3	722	468			0.000
27076	103.1	724	489			0.000
27077	58.0	927	461			0.000
27083		645	475			0.000
28003	408.0	731	492	280	0.57	0.003
28008	399.0	1020	442	420	0.95	0.000
28009	7486.0	771	487	410	0.84	0.000
28010	1054.0	1016	450	488	1.08	0.000
28011	690.0	1128	436	537	1.23	0.000
28014	591.0	737	496	461	0.93	0.000
28018	883.2	934	460	434	0.94	0.000
28020	236.0	948	463	457	0.99	0.001
28022	8231.0	756	488	408	0.84	0.002
28024	413.8	648	500	431	0.86	0.000
28025	169.4	677	499	392	0.79	0.000
28029	57.0	613	506	402	0.79	0.000
28030	8.4	746	497	453	0.91	0.000
28031	148.5	1085	435	329	0.76	0.000
28033	8.0	1363	402	362	0.90	0.000
28035	111.0	692	500			0.002
28038	46.0	1197	416	415	1.00	0.000
28040	53.2	882	485	518	1.07	0.005
28041	35.1	1067	446	431	0.97	0.000

STN NO	LF1	LF2	LF3	LF4	LF5	LF6	LF7	LF8	LF9	LF10	LF11	LF12
28043	0.00	0.00	0.97	22.41	4.42	1.99	23.52	0.00	21.68	24.72	0.00	0.29
28044	0.00	60.61	21.55	0.92	7.13	2.42	0.92	0.00	0.00	0.00	6.45	0.00
28046	0.00	0.00	0.00	77.24	0.00	0.00	8.79	0.00	13.96	0.00	0.00	0.00
28053	0.00	0.00	10.05	0.08	0.00	12.93	65.57	0.00	0.00	0.00	11.37	0.00
28054	0.00	0.00	0.00	0.00	0.00	1.48	81.48	9.63	0.00	0.00	7.41	0.00
28055	0.00	0.00	0.00	29.65	0.00	0.00	70.35	0.00	0.00	0.00	0.00	0.00
28058	0.00	0.00	4.39	20.02	0.00	0.00	75.59	0.00	0.00	0.00	0.00	0.00
28060	0.00	0.00	61.76	0.00	3.07	2.17	31.55	0.00	0.00	0.00	1.45	0.00
28066	0.00	0.00	0.00	0.00	0.00	4.39	22.59	0.00	0.00	0.00	73.02	0.00
28070	0.00	0.00	0.00	15.00	0.00	4.17	0.00	0.00	10.00	70.83	0.00	0.00
28072	0.00	0.00	23.15	0.00	4.06	5.28	60.23	0.00	0.00	0.00	7.28	0.00
28075	0.00	0.00	0.00	5.51	0.00	0.00	0.00	0.00	23.90	70.59	0.00	0.00
28079	0.00	0.00	37.10	1.67	0.00	12.36	48.87	0.00	0.00	0.00	0.00	0.00
28082	0.00	0.00	6.63	0.00	0.00	10.50	82.87	0.00	0.00	0.00	0.00	0.00
28083	0.00	0.00	5.52	6.64	0.00	1.29	42.13	0.00	0.21	1.58	42.63	0.00
28085	0.00	0.00	0.69	40.15	3.19	1.84	31.47	0.00	10.41	8.68	3.39	0.18
28086	0.00	0.00	0.00	0.00	0.00	1.56	82.82	10.15	0.00	0.00	5.47	0.00
28091	0.00	29.31	25.99	5.49	5.22	6.12	18.58	0.00	0.00	0.00	9.29	0.00
28093	0.00	4.08	1.76	0.00	0.00	4.29	66.72	12.47	0.00	0.00	10.61	0.09
29002	50.05	0.00	0.00	0.00	4.32	5.07	29.17	11.39	0.00	0.00	0.00	0.00
29003	61.93	0.00	0.00	0.00	5.04	0.00	27.86	0.00	0.00	0.00	5.17	0.00
29004	0.00	24.52	0.00	0.00	0.87	12.80	38.31	23.50	0.00	0.00	0.00	0.00
29005	15.67	0.00	3.97	0.00	1.78	32.54	14.29	31.75	0.00	0.00	0.00	0.00
29009	0.00	34.72	0.00	0.00	0.00	13.34	29.63	22.31	0.00	0.00	0.00	0.00
30001	0.00	38.25	0.07	0.00	0.20	9.62	14.85	33.23	0.00	0.00	3.78	0.00
30003	54.49	0.00	1.32	0.00	3.21	11.53	17.50	11.95	0.00	0.00	0.00	0.00
30004	7.67	0.00	22.94	0.00	0.67	10.20	10.20	48.33	0.00	0.00	0.00	0.00
30011	67.02	0.00	0.00	0.00	7.99	11.76	1.47	11.76	0.00	0.00	0.00	0.00
30012	22.22	0.00	0.69	0.00	0.00	15.97	38.89	22.23	0.00	0.00	0.00	0.00
30013	0.00	85.84	0.00	0.00	1.74	11.11	0.00	1.31	0.00	0.00	0.00	0.00
30015	0.00	82.94	0.00	0.00	0.00	0.00	9.52	7.54	0.00	0.00	0.00	0.00
30017	0.00	41.49	0.00	0.00	0.00	0.00	57.45	1.06	0.00	0.00	0.00	0.00
30018	0.00	36.96	0.00	0.00	0.00	17.39	4.35	41.30	0.00	0.00	0.00	0.00
30803	85.71	0.00	0.00	0.00	0.00	0.00	14.29	0.00	0.00	0.00	0.00	0.00
31006	0.00	52.47	0.00	0.00	0.00	0.00	23.28	15.35	0.00	0.00	0.00	8.90
31010	0.00	28.57	0.00	0.00	0.00	0.00	20.29	49.69	0.00	0.00	0.00	1.45
31011	0.00	29.17	0.00	0.00	0.00	7.27	45.46	18.11	0.00	0.00	0.00	0.00
31012	0.00	24.33	0.00	0.00	0.00	0.00	67.85	7.81	0.00	0.00	0.00	0.00
31016	0.00	67.14	0.00	0.00	0.00	0.00	31.43	1.43	0.00	0.00	0.00	0.00
31017	0.00	3.79	0.00	0.00	0.00	4.55	61.36	30.30	0.00	0.00	0.00	0.00

STN NO	AREA	SAAR	PE	LOSSES	r	FALAKE
28043	335.0	1180	430	552	1.28	0.012
28044	32.2	686	496	361	0.73	0.000
28046	83.0	1141	432	397	0.92	0.000
28053	272.0	707	496	439	0.89	0.002
28054	133.0	665	500	398	0.80	0.000
28055	50.4	841	469	416	0.89	0.000
28058	42.0	870	458	493	1.08	0.000
28060	69.0	686	502	617	1.23	0.000
28066	130.0	731	498	497	1.00	0.001
28070	9.1	985	448	396	0.88	0.000
28072	46.2	668	502	431	0.86	0.000
28075	17.0	1511	404			0.000
28079	86.3	788	499	560	1.12	0.001
28082	183.9	668	502	417	0.83	0.000
28083	195.2	829	491	.		0.004
28085	1054.0	1016	450	479	1.07	0.005
28086	113.0	666	500	374	0.75	0.000
28091	231.0	625	499			0.001
28093	1108.4	660	501			0.001
29002	77.4	718	491	417	0.85	0.000
29003	55.2	729	493	456	0.92	0.000
29004	54.7	635	498	453	0.91	0.000
29005	66.6	656	493	433	0.88	0.002
29009	27.2	642	498	465	0.93	0.000
30001	297.9	631	500	471	0.94	0.001
30003	197.1	705	492	487	0.99	0.001
30004	61.6	697	492	433	0.88	0.000
30011	62.5	743	490	552	1.13	0.002
30012	37.4	658	492	428	0.87	0.000
30013	21.2	608	498	400	0.80	0.000
30015	50.5	656	498	459	0.92	0.000
30017	51.3	649	496			0.000
30018	22.3	623	502			0.000
30803	7.7	668	495			0.000
31006	150.0	639	503	433	0.86	0.001
31010	68.9	640	503	393	0.78	0.000
31011	31.6	652	502			0.000
31012	24.9	622	501			0.000
31016	36.5	641	500	434	0.87	0.003
31017	42.7	660	501			0.000

STN NO	LF1	LF2	LF3	LF4	LF5	LF6	LF7	LF8	LF9	LF10	LF11	LF12
31018	0.00	0.00	0.00	0.00	0.00	5.17	34.48	60.35	0.00	0.00	0.00	0.00
31019	0.00	0.00	0.00	0.00	0.00	0.00	27.58	72.42	0.00	0.00	0.00	0.00
31020	0.00	54.63	0.00	0.00	0.00	0.00	5.56	39.81	0.00	0.00	0.00	0.00
31022	0.00	0.00	0.00	0.00	0.00	0.00	45.00	55.00	0.00	0.00	0.00	0.00
31023	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00
31024	0.00	56.25	0.00	0.00	0.00	0.00	26.92	16.83	0.00	0.00	0.00	0.00
31025	0.00	0.00	0.00	0.00	0.00	0.00	79.17	20.83	0.00	0.00	0.00	0.00
31026	0.00	83.33	0.00	0.00	0.00	0.00	0.00	16.67	0.00	0.00	0.00	0.00
32003	0.00	11.90	0.00	0.00	0.00	0.00	71.81	13.73	0.00	0.00	2.56	0.00
32004	0.00	32.24	0.00	0.00	0.00	3.57	37.76	22.35	0.00	0.00	4.08	0.00
32006	0.00	11.03	6.16	0.00	0.00	4.80	17.35	58.83	0.00	0.00	1.83	0.00
32012	0.00	11.30	0.00	0.00	0.56	0.00	76.77	9.57	0.00	0.00	1.79	0.00
32015	0.00	0.00	0.00	0.00	0.00	0.00	33.34	0.00	0.00	0.00	66.66	0.00
32016	0.00	0.00	0.00	0.00	0.00	0.00	44.44	0.00	0.00	0.00	55.56	0.00
32018	0.00	17.48	0.00	0.00	0.00	4.84	41.93	35.76	0.00	0.00	0.00	0.00
32019	0.00	44.79	0.00	0.00	0.00	0.00	25.85	15.57	0.00	0.00	13.79	0.00
32020	0.00	90.69	0.00	0.00	0.00	0.00	0.00	9.31	0.00	0.00	0.00	0.00
32024	0.00	21.26	0.00	0.00	0.00	0.00	55.00	23.74	0.00	0.00	0.00	0.00
32026	0.00	17.57	0.00	0.00	0.17	0.00	38.71	43.55	0.00	0.00	0.00	0.00
32027	0.00	3.11	0.00	0.00	0.00	0.00	64.00	32.89	0.00	0.00	0.00	0.00
32029	0.00	0.00	0.00	0.00	0.00	0.00	75.00	25.00	0.00	0.00	0.00	0.00
32030	0.00	37.04	0.00	0.00	0.00	0.00	44.44	18.52	0.00	0.00	0.00	0.00
32031	0.00	14.68	3.85	0.00	0.67	1.28	62.82	15.41	0.00	0.00	1.28	0.00
33002	1.44	10.54	2.89	0.00	1.33	4.55	52.79	24.15	0.00	0.00	2.32	0.00
33003	40.15	0.00	2.03	0.00	0.00	8.30	35.60	9.52	0.00	0.00	4.40	0.00
33006	32.77	0.00	16.28	0.00	1.22	16.31	33.42	0.00	0.00	0.00	0.00	0.00
33007	41.07	0.00	28.65	0.00	0.00	5.88	24.40	0.00	0.00	0.00	0.00	0.00
33009	1.61	9.80	2.79	0.00	1.04	4.70	53.01	25.22	0.00	0.00	1.82	0.00
33011	16.80	0.00	28.70	0.00	0.00	6.10	48.40	0.00	0.00	0.00	0.00	0.00
33013	20.96	0.00	13.80	0.00	0.92	3.67	60.65	0.00	0.00	0.00	0.00	0.00
33014	47.37	0.00	13.82	0.00	0.00	3.73	31.34	0.00	0.00	0.00	3.73	0.00
33015	7.63	0.00	5.32	0.00	1.07	9.06	35.02	33.20	0.00	0.00	8.69	0.00
33018	0.00	9.88	0.00	0.00	0.08	0.73	58.40	30.92	0.00	0.00	0.00	0.00
33019	21.54	0.00	18.64	0.00	1.15	15.85	42.82	0.00	0.00	0.00	0.00	0.00
33020	0.00	0.00	0.00	0.00	0.00	0.50	46.24	53.27	0.00	0.00	0.00	0.00
33021	51.82	0.00	2.63	0.00	0.00	11.34	19.08	15.13	0.00	0.00	0.00	0.00
33022	20.95	0.00	21.22	0.00	1.72	6.07	30.37	15.85	0.00	0.00	3.83	0.00
33024	45.50	0.00	1.50	0.00	0.00	3.00	48.00	0.00	0.00	0.00	2.00	0.00
33027	38.07	0.00	0.68	0.00	0.00	5.32	24.57	31.36	0.00	0.00	0.00	0.00
33029	69.00	0.00	8.78	0.00	0.00	6.00	12.23	4.00	0.00	0.00	0.00	0.00

STN NO	AREA	SAAR	PE	LOSSES	r	FALAKE
31018	55.1	655	501			0.002
31019	27.9	648	503			0.000
31020	19.6	630	506			0.000
31022	20.8	653	505			0.000
31023	4.4	647	498			0.000
31024	22.3	617	505	440	0.87	0.000
31025	24.5	675	497	396	0.80	0.000
31026	2.5	653	498			0.000
32003	74.3	620	519	444	0.86	0.000
32004	194.0	631	514	410	0.80	0.002
32006	223.0	676	504	478	0.95	0.003
32012	53.3	632	526			0.000
32015	7.1	620	512			0.000
32016	7.6	621	513	451	0.88	0.000
32018	62.4	655	505			0.000
32019	58.3	632	516			0.004
32020	46.9	588	526	435	0.83	0.002
32024	20.5	596	522			0.000
32026	58.0	656	505			0.000
32027	24.3	599	528			0.000
32029	7.0	648	514			0.000
32030	8.5	682	498			0.000
32031	73.9	633	526			0.000
33002	1460.0	648	522	426	0.82	0.002
33003	803.0	580	526	440	0.84	0.000
33006	274.5	663	527	448	0.85	0.002
33007	153.3	686	523	434	0.83	0.001
33009	1320.0	655	521	429	0.82	0.002
33011	128.7	602	526	495	0.94	0.001
33013	205.9	606	526	500	0.95	0.000
33014	272.0	609	526	456	0.87	0.001
33015	277.1	656	515	436	0.85	0.000
33018	138.1	697	509	457	0.90	0.000
33019	316.0	636	526	448	0.85	0.000
33020	201.5	607	525	474	0.90	0.000
33021	303.0	573	526	443	0.84	0.000
33022	541.3	587	524	409	0.78	0.001
33024	198.0	602	526	444	0.85	0.001
33027	119.1	567	526	426	0.81	0.000
33029	98.8	634	531	464	0.87	0.000

STN NO	LF1	LF2	LF3	LF4	LF5	LF6	LF7	LF8	LF9	LF10	LF11	LF12
33031	0.00	0.00	20.23	0.00	0.99	2.22	37.77	38.80	0.00	0.00	0.00	0.00
33032	67.25	0.00	32.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33034	24.67	0.00	18.96	0.00	0.75	9.57	45.07	0.00	0.00	0.00	0.97	0.00
33037	0.00	12.49	0.98	0.00	1.03	3.34	58.37	23.80	0.00	0.00	0.00	0.00
33040	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33044	16.31	0.00	18.53	0.00	1.30	16.96	46.90	0.00	0.00	0.00	0.00	0.00
33045	0.00	0.00	26.90	0.00	0.00	6.90	66.21	0.00	0.00	0.00	0.00	0.00
33046	4.90	0.00	13.90	0.00	1.94	13.06	66.20	0.00	0.00	0.00	0.00	0.00
33048	43.75	0.00	20.42	0.00	0.00	25.00	10.83	0.00	0.00	0.00	0.00	0.00
33049	39.37	0.00	10.85	0.00	5.48	26.12	18.19	0.00	0.00	0.00	0.00	0.00
33050	49.93	0.00	8.23	0.00	0.00	2.45	33.33	0.00	0.00	0.00	6.06	0.00
33051	32.75	0.00	0.58	0.00	0.00	0.00	63.77	0.00	0.00	0.00	2.90	0.00
33052	65.55	0.00	6.64	0.00	0.00	7.29	20.51	0.00	0.00	0.00	0.00	0.00
33054	58.14	0.00	22.71	0.00	0.00	19.15	0.00	0.00	0.00	0.00	0.00	0.00
33055	42.26	0.00	1.03	0.00	0.00	0.00	56.71	0.00	0.00	0.00	0.00	0.00
33058	9.67	0.00	5.50	0.00	1.21	11.46	34.13	31.59	0.00	0.00	6.42	0.00
33063	14.23	0.00	24.17	0.00	0.00	5.51	56.10	0.00	0.00	0.00	0.00	0.00
33066	21.34	0.00	0.33	0.00	0.00	0.00	78.33	0.00	0.00	0.00	0.00	0.00
33809	0.00	0.00	0.00	0.00	0.00	0.00	88.71	11.29	0.00	0.00	0.00	0.00
34001	0.00	0.00	21.06	0.00	0.00	3.46	74.18	0.00	0.00	0.00	1.30	0.00
34002	0.00	0.00	12.84	0.00	0.00	0.67	86.49	0.00	0.00	0.00	0.00	0.00
34003	0.00	0.00	55.02	0.00	28.74	7.80	8.44	0.00	0.00	0.00	0.00	0.00
34004	12.62	0.00	36.15	0.00	1.43	7.46	41.64	0.00	0.00	0.00	0.71	0.00
34005	0.00	0.00	38.16	0.00	0.00	3.95	57.89	0.00	0.00	0.00	0.00	0.00
34006	4.43	0.00	3.80	0.00	0.16	4.75	86.86	0.00	0.00	0.00	0.00	0.00
34007	8.75	0.00	1.40	0.00	0.00	1.70	88.14	0.00	0.00	0.00	0.00	0.00
34008	0.00	0.00	56.95	0.00	32.56	6.72	0.00	0.00	0.00	0.00	3.77	0.00
34010	2.48	0.00	7.09	0.00	0.40	8.41	81.62	0.00	0.00	0.00	0.00	0.00
34011	40.00	0.00	42.91	0.00	0.34	5.45	11.31	0.00	0.00	0.00	0.00	0.00
34012	68.98	0.00	30.03	0.00	0.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00
34014	18.13	0.00	32.58	0.00	0.14	5.93	43.21	0.00	0.00	0.00	0.00	0.00
34018	46.90	0.00	22.60	0.00	0.95	1.97	27.57	0.00	0.00	0.00	0.00	0.00
34019	0.00	0.00	49.99	0.00	32.12	13.13	4.45	0.00	0.00	0.00	0.31	0.00
35003	0.00	0.00	6.35	0.00	0.00	0.00	93.65	0.00	0.00	0.00	0.00	0.00
35004	6.23	0.00	8.12	0.00	0.00	1.89	83.77	0.00	0.00	0.00	0.00	0.00
35008	0.00	0.00	1.42	0.00	0.00	0.79	97.79	0.00	0.00	0.00	0.00	0.00
35011	0.00	0.00	27.94	0.00	10.16	0.00	54.76	0.00	0.00	0.00	7.14	0.00
35013	0.00	0.00	2.05	0.00	0.00	0.00	97.95	0.00	0.00	0.00	0.00	0.00
36002	1.16	0.00	5.97	0.00	2.17	0.00	90.70	0.00	0.00	0.00	0.00	0.00
36003	0.00	0.00	19.02	0.00	6.91	0.00	74.07	0.00	0.00	0.00	0.00	0.00

STN NO	AREA	SAAR	PE	LOSSES	r	FALAKE
33031	66.6	619	525	471	0.90	0.000
33032	59.0	694	527	580	1.10	0.000
33034	699.3	618	526	440	0.84	0.001
33037	800.0	667	521	462	0.89	0.002
33040	1.0	591	526			0.000
33044	277.8	640	526	466	0.89	0.000
33045	28.3	627	526	474	0.90	0.000
33046	145.3	658	527	464	0.88	0.000
33048	21.4	618	526	538	1.02	0.008
33049	43.5	635	527	443	0.84	0.005
33050	60.6	588	526	427	0.81	0.000
33051	141.0	611	525	474	0.90	0.000
33052	36.4	569	527	429	0.81	0.000
33054	47.7	695	525	349	0.67	0.000
33055	98.7	614	526	531	1.01	0.000
33058	215.0	659	512	383	0.75	0.000
33063	101.0	602	526	447	0.85	0.002
33066	59.8	629	525	514	0.98	0.000
33809	65.3	559	530			0.000
34001	231.8	666	528	469	0.89	0.001
34002	146.5	617	527	456	0.86	0.000
34003	164.7	686	526	473	0.90	0.001
34004	536.1	670	524	424	0.81	0.003
34005	73.2	647	530	494	0.93	0.000
34006	370.0	603	527	443	0.84	0.000
34007	133.9	601	527	426	0.81	0.000
34008	49.3	647	531	444	0.84	0.005
34010	149.4	605	527	439	0.83	0.000
34011	127.1	700	520	474	0.91	0.001
34012	80.0	675	524	537	1.02	0.000
34014	363.0	684	522	448	0.86	0.000
34018	77.1	657	523	433	0.83	0.000
34019	313.0	669	526	446	0.85	0.002
35003	63.9	609	533	465	0.87	0.000
35004	54.9	609	533	423	0.79	0.000
35008	128.9	606	526	453	0.86	0.000
35011	40.4	559	528			0.000
35013	92.9	612	533	469	0.88	0.000
36002	87.3	618	525	442	0.84	0.000
36003	53.9	602	526	476	0.90	0.000

STN NO	LF1	LF2	LF3	LF4	LF5	LF6	LF7	LF8	LF9	LF10	LF11	LF12
36005	0.00	0.00	6.38	0.00	2.32	0.00	91.30	0.00	0.00	0.00	0.00	0.00
36007	11.86	0.00	17.40	0.00	6.33	0.00	64.41	0.00	0.00	0.00	0.00	0.00
36009	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00
36010	0.00	0.00	0.00	0.00	0.00	0.00	93.10	0.00	0.00	0.00	6.90	0.00
37001	0.00	0.00	0.00	0.00	2.15	2.87	60.51	26.26	0.00	0.00	8.20	0.00
37005	0.42	0.00	18.57	0.00	5.91	4.70	69.02	0.54	0.00	0.00	0.84	0.00
37008	0.00	0.00	19.86	0.00	7.22	0.00	70.84	0.00	0.00	0.00	2.08	0.00
37009	0.00	0.00	24.44	0.00	8.89	0.00	51.66	0.00	0.00	0.00	15.00	0.00
37011	0.00	0.00	14.86	0.00	5.41	0.00	79.73	0.00	0.00	0.00	0.00	0.00
37012	1.56	0.00	5.73	0.00	2.08	0.00	90.63	0.00	0.00	0.00	0.00	0.00
37013	0.00	0.00	7.64	0.00	0.54	2.56	11.44	69.93	0.00	0.00	1.32	6.58
37016	0.00	0.00	13.01	0.00	4.73	0.00	82.26	0.00	0.00	0.00	0.00	0.00
37019	0.00	0.00	0.00	0.00	0.36	0.36	11.13	33.98	0.00	0.00	54.18	0.00
37020	0.00	0.00	16.84	0.00	6.12	0.00	77.04	0.00	0.00	0.00	0.00	0.00
37021	0.00	0.00	13.72	0.00	0.49	33.20	26.33	11.44	0.00	0.00	14.81	0.00
37031	0.00	0.00	0.00	0.00	0.00	0.00	7.11	46.31	0.00	0.00	46.58	0.00
37033	0.00	0.00	0.00	0.00	4.44	3.89	12.20	4.47	0.00	0.00	75.00	0.00
38002	24.10	0.00	0.00	0.00	0.21	0.21	72.71	1.57	0.00	0.00	1.20	0.00
38003	40.08	0.00	3.81	0.00	1.38	0.00	50.29	0.00	0.00	0.00	4.44	0.00
38007	4.35	0.00	0.00	0.00	0.00	0.00	26.09	0.00	0.00	0.00	69.56	0.00
38014	0.00	0.00	0.00	0.00	0.00	0.00	3.48	53.05	0.00	0.00	43.48	0.00
38018	17.48	0.00	4.20	0.00	2.32	0.70	35.24	6.95	0.00	0.00	33.12	0.00
38022	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.95	0.00	0.00	82.05	0.00
38024	0.00	0.00	0.00	0.00	6.51	22.76	1.95	29.75	0.00	0.00	36.59	2.44
38026	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00
38029	6.52	0.00	0.00	0.00	0.00	0.00	93.48	0.00	0.00	0.00	0.00	0.00
38030	12.88	0.00	6.29	0.00	2.25	0.00	68.47	0.00	0.00	0.00	10.11	0.00
39002	1.63	38.62	6.97	0.19	0.97	9.05	4.20	35.16	0.00	0.00	3.13	0.09
39003	20.36	0.00	2.62	0.00	1.07	0.00	13.42	0.03	0.00	0.00	62.49	0.00
39005	4.88	0.00	0.57	0.00	0.29	2.40	0.72	0.90	0.00	0.00	90.24	0.00
39006	0.00	67.31	2.96	0.00	0.11	3.84	0.22	25.56	0.00	0.00	0.00	0.00
39011	31.88	0.00	28.55	0.73	8.98	4.30	8.78	12.12	0.00	0.00	4.66	0.00
39015	79.43	0.00	0.00	0.00	9.71	4.34	0.00	6.52	0.00	0.00	0.00	0.00
39016	49.67	0.09	6.40	0.09	7.70	6.47	14.38	14.25	0.00	0.00	0.96	0.00
39017	0.00	0.00	0.00	0.00	0.00	0.00	5.00	95.00	0.00	0.00	0.00	0.00
39019	65.03	0.00	1.75	0.00	8.13	1.26	21.90	1.93	0.00	0.00	0.00	0.00
39020	0.00	81.73	0.00	0.00	0.00	0.00	0.00	18.27	0.00	0.00	0.00	0.00
39021	0.00	39.64	0.50	0.00	1.17	2.91	3.45	50.88	0.00	0.00	1.45	0.00
39022	22.66	0.00	1.55	0.00	4.01	4.35	2.85	51.04	0.00	0.00	13.53	0.00
39023	45.27	0.00	3.13	0.00	5.40	0.00	27.67	1.39	0.00	0.00	17.14	0.00

STN NO	AREA	SAAR	PE	LOSSES	r	FALAKE
36005	156.0	602	525	460	0.88	0.000
36007	58.6	563	527	464	0.88	0.000
36009	25.7	609	526	454	0.86	0.000
36010	28.3	617	526	458	0.87	0.000
37001	303.3	610	543	401	0.74	0.000
37005	238.2	595	533	457	0.86	0.001
37008	190.3	600	533	425	0.80	0.000
37009	60.7	596	537	402	0.75	0.000
37011	72.6	601	528	444	0.84	0.000
37012	65.1	604	528	470	0.89	0.000
37013	60.6	586	547	432	0.79	0.002
37016	62.5	612	527			0.000
37019	49.7	598	548	382	0.70	0.000
37020	132.1	602	530	440	0.83	0.000
37021	52.6	570	545	432	0.79	0.000
37031	71.8	594	548	441	0.80	0.000
37033	10.4	570	550	415	0.76	0.000
38002	78.7	629	528	503	0.95	0.000
38003	133.9	641	518	514	0.99	0.000
38007	21.4	611	542	327	0.60	0.000
38014	20.5	654	548	414	0.76	0.006
38018	150.0	654	517	385	0.74	0.001
38022	42.6	671	548	355	0.65	0.000
38024	41.5	623	546	361	0.66	0.000
38026	54.6	617	533	433	0.81	0.002
38029	50.4	650	525	542	1.03	0.000
38030	175.1	641	526	529	1.00	0.000
39002	3444.7	716	521	458	0.88	0.002
39003	176.1	736	520	440	0.85	0.000
39005	43.6	636	554	253	0.46	0.000
39006	362.6	769	506	483	0.95	0.002
39011	396.3	867	521	633	1.22	0.003
39015	44.5	800	521	523	1.00	0.000
39016	1033.4	770	525	477	0.91	0.001
39017	18.6	650	528	477	0.90	0.000
39019	234.1	737	527	506	0.96	0.000
39020	106.7	818	498	424	0.85	0.003
39021	551.7	700	506	480	0.95	0.001
39022	164.5	751	534	338	0.63	0.001
39023	137.3	780	514	548	1.07	0.006

STN NO	LF1	LF2	LF3	LF4	LF5	LF6	LF7	LF8	LF9	LF10	LF11	LF12
39028	43.62	0.00	1.41	0.00	12.99	3.79	31.36	6.83	0.00	0.00	0.00	0.00
39029	16.17	0.00	76.02	0.00	1.04	2.84	3.50	0.44	0.00	0.00	0.00	0.00
39031	73.68	0.00	0.00	0.00	9.78	0.00	16.54	0.00	0.00	0.00	0.00	0.00
39033	48.57	0.00	2.63	0.00	3.42	1.37	37.60	6.41	0.00	0.00	0.00	0.00
39034	0.00	53.51	1.71	0.16	2.27	1.56	8.86	31.93	0.00	0.00	0.00	0.00
39036	0.00	0.00	98.68	0.00	1.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00
39042	0.00	80.20	3.74	0.00	0.00	2.27	0.00	13.79	0.00	0.00	0.00	0.00
39043	83.43	0.30	0.00	0.03	12.58	1.30	1.06	0.00	0.00	0.00	1.30	0.00
39046	1.63	39.27	6.06	0.17	0.96	9.01	4.03	35.64	0.00	0.00	3.15	0.09
39049	0.00	0.00	0.00	0.00	0.00	0.00	5.00	29.38	0.00	0.00	65.62	0.00
39051	0.00	61.41	0.00	0.00	0.10	0.00	1.82	33.04	0.00	0.00	3.64	0.00
39054	0.00	0.00	9.97	0.00	0.00	2.94	12.87	41.87	0.00	0.00	32.35	0.00
39056	24.46	0.00	9.58	0.00	2.33	0.00	7.25	0.92	0.00	0.00	55.47	0.00
39057	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.75	0.00	0.00	85.25	0.00
39058	0.00	0.00	2.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	97.22	0.00
39061	94.44	0.00	0.00	0.00	5.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00
39065	84.23	0.00	0.00	0.00	0.00	0.00	15.77	0.00	0.00	0.00	0.00	0.00
39068	4.10	0.00	9.47	0.14	0.06	6.21	21.52	42.72	0.00	0.00	15.79	0.00
39072	16.66	19.63	8.22	0.20	3.03	9.00	8.39	29.61	0.00	0.00	5.18	0.07
39076	0.00	74.98	1.04	0.00	0.14	1.31	0.00	22.53	0.00	0.00	0.00	0.00
39078	64.91	0.00	1.25	0.85	12.93	1.93	8.01	6.92	0.00	0.00	3.19	0.00
39079	15.96	0.00	30.61	0.28	5.57	11.07	9.40	18.41	0.00	0.00	8.70	0.00
39081	7.03	15.95	14.66	0.73	0.72	16.93	16.10	27.44	0.00	0.00	0.43	0.00
39088	27.77	0.00	7.39	0.00	3.88	0.00	58.92	0.00	0.00	0.00	2.04	0.00
39089	35.93	0.00	0.00	0.00	12.21	0.00	49.73	0.00	0.00	0.00	2.13	0.00
39090	11.05	10.13	5.04	0.15	2.20	12.40	11.62	38.52	0.00	0.00	8.89	0.00
39093	0.00	0.00	0.00	0.00	0.00	0.00	1.54	18.65	0.00	0.00	79.82	0.00
39095	0.00	0.00	2.70	0.00	0.00	0.00	0.00	5.41	0.00	0.00	91.89	0.00
39096	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.26	0.00	0.00	94.74	0.00
39097	1.78	45.07	6.15	0.22	0.34	8.65	2.04	31.06	0.00	0.00	4.59	0.10
39098	0.00	0.00	0.00	0.00	0.00	0.00	2.35	21.17	0.00	0.00	76.48	0.00
39101	86.56	0.00	0.00	0.00	7.64	0.00	5.80	0.00	0.00	0.00	0.00	0.00
39102	34.43	0.00	7.24	0.00	9.40	2.90	30.23	3.48	0.00	0.00	12.32	0.00
40006	19.47	5.10	21.44	0.00	0.36	1.44	27.22	24.97	0.00	0.00	0.00	0.00
40007	0.00	0.00	6.42	0.00	0.00	0.79	66.53	16.22	0.00	1.39	8.27	0.39
40008	20.14	2.32	13.19	0.00	2.85	9.84	21.34	24.23	0.00	0.00	6.09	0.00
40011	32.41	1.53	8.71	0.00	6.72	7.74	22.56	16.30	0.00	0.00	4.02	0.00
40017	0.00	0.00	6.43	0.00	0.00	0.00	61.57	32.00	0.00	0.00	0.00	0.00
40020	0.00	0.00	6.68	0.00	0.00	0.00	67.72	17.76	0.00	0.00	7.84	0.00
40021	0.00	0.00	5.56	0.00	0.00	0.00	60.52	33.91	0.00	0.00	0.00	0.00

STN NO	AREA	SAAR	PE	LOSSES	r	FALAKE
39028	101.3	789	525	557	1.06	0.000
39029	59.0	821	516	521	1.01	0.000
39031	176.0	748	525	566	1.08	0.000
39033	49.2	715	530	609	1.15	0.000
39034	430.0	731	510	460	0.90	0.003
39036	16.0	837	520	612	1.18	0.000
39042	76.9	774	519	463	0.89	0.000
39043	295.0	800	518	527	1.02	0.000
39046	3414.0	718	521			0.000
39049	29.0	699	548	417	0.76	0.002
39051	106.4	703	503	451	0.90	0.000
39054	31.8	827	526	481	0.91	0.004
39056	67.6	716	525	527	1.00	0.000
39057	61.7	654	553	387	0.70	0.000
39058	38.3	661	548	508	0.93	0.000
39061	2.7	748	526			0.000
39065	13.4	719	528	606	1.15	0.000
39068	316.0	791	526	403	0.77	0.000
39072	7046.0	716	528			0.000
39076	296.0	784	500	506	1.01	0.000
39078	191.1	887	523	778	1.49	0.000
39079	1008.0	791	528			0.000
39081	234.0	647	535	442	0.83	0.000
39088	105.0	761	511	579	1.13	0.000
39089	48.2	726	497	621	1.25	0.000
39090	140.0	681	529			0.000
39093	117.6	691	549	417	0.76	0.003
39095	33.5	657	553	513	0.93	0.000
39096	21.7	674	551	436	0.79	0.000
39097	997.0	768	525	468	0.89	0.000
39098	33.3	690	549			0.004
39101	53.1	785	514	657	1.28	0.000
39102	136.0	761	523			0.000
40006	50.3	733	518	487	0.94	0.000
40007	255.1	852	514	482	0.94	0.003
40008	230.0	750	532	458	0.86	0.001
40011	345.0	760	526	461	0.88	0.001
40017	27.5	909	520			0.000
40020	53.7	880	502			0.000
40021	32.4	779	548			0.000

STN NO	LF1	LF2	LF3	LF4	LF5	LF6	LF7	LF8	LF9	LF10	LF11	LF12
40024	0.00	0.00	8.37	0.00	0.00	0.00	84.85	6.33	0.00	0.45	0.00	0.00
41001	0.00	0.00	4.73	0.00	0.00	0.00	54.09	41.18	0.00	0.00	0.00	0.00
41002	0.00	0.00	5.48	0.00	0.00	0.00	59.85	34.68	0.00	0.00	0.00	0.00
41003	1.43	0.00	5.24	0.00	0.63	2.52	50.22	38.53	0.00	0.00	1.43	0.00
41005	0.00	0.00	10.53	0.00	0.00	0.00	77.74	8.14	0.00	0.38	3.21	0.00
41006	0.00	0.00	5.91	0.00	0.00	0.00	64.21	26.20	0.00	0.27	3.41	0.00
41009	3.96	0.00	42.90	0.99	2.52	7.88	14.59	27.18	0.00	0.00	0.00	0.00
41010	0.00	0.00	0.75	0.00	0.00	0.00	24.64	74.61	0.00	0.00	0.00	0.00
41011	7.87	0.00	37.80	1.68	1.95	5.32	21.30	24.08	0.00	0.00	0.00	0.00
41012	3.12	0.00	3.53	0.00	0.11	0.00	40.54	40.86	0.00	0.00	11.83	0.00
41013	0.00	0.00	6.08	0.00	0.00	0.00	64.51	29.41	0.00	0.00	0.00	0.00
41014	0.00	0.00	12.09	0.00	0.48	8.07	18.38	58.59	0.00	0.00	2.39	0.00
41016	0.00	0.00	7.47	0.00	0.00	0.00	75.20	17.34	0.00	0.00	0.00	0.00
41017	0.00	0.00	4.17	0.00	0.00	2.94	53.21	39.68	0.00	0.00	0.00	0.00
41020	5.88	0.00	0.52	0.00	0.00	0.00	17.63	75.97	0.00	0.00	0.00	0.00
41022	0.00	0.00	20.37	0.00	0.00	22.47	11.48	45.68	0.00	0.00	0.00	0.00
41024	0.00	0.00	9.46	0.00	0.00	0.00	90.54	0.00	0.00	0.00	0.00	0.00
41025	0.00	0.00	9.21	0.00	0.82	4.25	14.01	71.71	0.00	0.00	0.00	0.00
41026	0.00	0.00	5.78	0.00	0.00	0.00	72.00	20.59	0.00	1.63	0.00	0.00
41027	9.44	0.00	28.97	2.25	5.14	6.11	25.46	22.62	0.00	0.00	0.00	0.00
41028	8.34	0.00	13.87	0.00	0.00	0.00	19.61	45.68	0.00	0.00	12.50	0.00
41029	0.00	0.00	7.21	0.00	0.00	0.00	73.18	19.61	0.00	0.00	0.00	0.00
41806	0.00	0.00	8.82	0.00	0.00	0.00	41.18	50.00	0.00	0.00	0.00	0.00
41807	25.00	0.00	0.00	0.00	0.00	0.00	6.62	68.38	0.00	0.00	0.00	0.00
42001	46.60	0.00	2.63	0.00	6.36	2.32	3.16	31.91	0.00	0.00	7.02	0.00
42003	0.00	0.00	4.27	0.00	2.47	29.88	22.07	41.32	0.00	0.00	0.00	0.00
42006	88.67	0.00	0.00	0.16	8.55	0.00	1.23	1.39	0.00	0.00	0.00	0.00
42007	90.76	0.00	0.00	0.00	7.60	1.64	0.00	0.00	0.00	0.00	0.00	0.00
42009	89.54	0.00	0.00	0.00	10.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00
42010	82.10	0.00	0.34	0.00	10.03	2.17	0.07	0.41	0.00	0.00	4.89	0.00
42011	70.68	0.00	0.00	0.00	6.90	0.54	0.36	21.51	0.00	0.00	0.00	0.00
42012	77.85	0.00	1.61	0.00	13.11	0.54	0.44	0.00	0.00	0.00	6.45	0.00
42014	17.65	0.00	14.59	0.00	2.87	7.22	9.36	48.30	0.00	0.00	0.00	0.00
42015	83.93	0.00	0.00	0.00	16.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
42016	88.13	0.00	0.00	0.00	10.64	1.23	0.00	0.00	0.00	0.00	0.00	0.00
42018	3.79	0.00	6.45	0.00	2.66	4.58	3.06	47.20	0.00	0.00	32.26	0.00
42019	0.00	0.00	3.36	0.00	1.68	8.45	8.71	34.94	0.00	0.00	42.86	0.00
42020	34.13	0.00	19.05	0.00	6.51	6.73	3.01	30.57	0.00	0.00	0.00	0.00
43003	68.63	1.05	5.05	0.12	8.47	4.97	5.85	3.81	0.00	0.00	2.06	0.00
43004	85.77	0.00	0.44	0.00	10.14	0.62	2.41	0.00	0.00	0.00	0.62	0.00

STN NO	AREA	SAAR	PE	LOSSES	r	FALAKE
40024	25.1	865	510			0.000
41001	16.9	772	529	436	0.82	0.000
41002	18.4	857	528	429	0.81	0.007
41003	134.7	821	528	431	0.82	0.003
41005	180.9	835	524	456	0.87	0.000
41006	87.8	837	518	427	0.82	0.000
41009	345.8	918	521	474	0.91	0.002
41010	109.1	804	531	532	1.00	0.001
41011	154.0	934	518	488	0.94	0.003
41012	93.3	830	526	434	0.82	0.003
41013	14.2	823	527	483	0.92	0.000
41014	379.0	800	524	496	0.95	0.002
41016	18.7	836	523	607	1.16	0.000
41017	30.5	782	543	463	0.85	0.000
41020	34.6	879	529	457	0.86	0.000
41022	52.0	887	515	541	1.05	0.005
41024	22.6	866	526	523	0.99	0.005
41025	91.6	806	516	434	0.84	0.000
41026	36.1	849	521	502	0.96	0.000
41027	37.2	933	519	502	0.97	0.003
41028	24.0	847	526	475	0.90	0.000
41029	40.8	820	528			0.000
41806	2.3	941	528			0.000
41807	5.6	954	528			0.000
42001	111.0	866	533	683	1.28	0.001
42003	98.9	872	535	551	1.03	0.000
42006	72.8	927	524	502	0.96	0.000
42007	57.0	880	521	10	0.02	0.001
42009	71.2	874	522	634	1.21	0.000
42010	360.0	873	524	408	0.78	0.001
42011	56.6	874	529	641	1.21	0.000
42012	185.0	802	509	487	0.96	0.000
42014	104.7	867	526	576	1.09	0.000
42015	52.7	836	521			0.000
42016	236.8	889	522			0.000
42018	43.3	819	534			0.000
42019	16.0	801	538	456	0.85	0.000
42020	19.0	823	530			0.000
43003	1477.8	838	517	504	0.98	0.001
43004	163.6	787	515	640	1.24	0.000

STN NO	LF1	LF2	LF3	LF4	LF5	LF6	LF7	LF8	LF9	LF10	LF11	LF12
43005	65.15	0.00	5.27	0.00	7.38	5.35	16.26	0.29	0.00	0.00	0.31	0.00
43006	41.30	7.02	13.64	0.79	5.95	6.32	4.02	20.51	0.00	0.00	0.46	0.00
43007	34.97	5.71	5.87	0.00	6.28	7.59	3.57	33.95	0.00	0.00	2.06	0.00
43008	81.54	0.00	2.28	0.00	9.86	3.03	1.97	0.00	0.00	0.00	1.32	0.00
43011	82.13	0.00	1.90	0.00	12.27	1.12	0.71	0.00	0.00	0.00	1.87	0.00
43012	63.21	0.00	7.41	0.00	13.26	5.14	5.93	0.00	0.00	0.00	5.04	0.00
43014	33.07	0.00	13.57	0.00	4.10	7.28	40.93	1.06	0.00	0.00	0.00	0.00
43017	50.37	0.00	6.72	0.00	10.67	10.39	21.85	0.00	0.00	0.00	0.00	0.00
43019	39.10	0.00	1.68	0.00	10.90	3.57	5.46	35.72	0.00	0.00	3.57	0.00
43021	62.16	0.89	7.09	0.10	7.93	6.92	6.70	6.26	0.00	0.02	1.93	0.00
44001	40.30	0.00	12.17	0.00	8.67	12.99	20.29	3.71	0.00	0.19	1.68	0.00
44002	59.90	0.00	11.13	0.00	10.58	7.84	8.46	2.08	0.00	0.00	0.00	0.00
44003	7.18	8.94	34.56	0.00	0.32	2.94	16.99	29.06	0.00	0.00	0.00	0.00
44004	46.82	0.00	4.74	0.00	11.34	5.49	26.72	3.69	0.00	0.28	0.92	0.00
44006	45.91	0.00	0.00	0.00	13.46	0.00	40.63	0.00	0.00	0.00	0.00	0.00
44009	56.66	12.96	0.00	0.00	10.00	0.00	0.00	20.37	0.00	0.00	0.00	0.00
45001	0.00	1.67	7.14	3.40	0.22	1.92	71.60	0.00	6.78	6.45	0.49	0.33
45002	0.00	0.10	0.37	4.70	0.32	1.03	73.89	0.00	9.79	9.32	0.00	0.47
45003	2.91	2.30	20.61	2.22	0.00	21.77	47.13	0.00	0.00	3.06	0.00	0.00
45004	7.78	0.35	5.53	0.00	8.44	11.57	37.52	25.43	0.00	2.34	1.05	0.00
45005	1.60	0.00	21.95	1.33	0.00	12.03	57.85	0.00	0.00	3.65	1.60	0.00
45008	2.48	0.00	11.43	0.00	0.00	12.30	67.50	0.00	0.00	5.35	0.94	0.00
45010	0.00	0.00	0.00	7.84	0.00	1.73	86.51	0.00	0.00	0.00	0.00	3.92
45011	0.00	0.00	0.00	1.33	0.00	0.00	57.89	0.00	22.29	18.48	0.00	0.00
45012	0.00	4.86	20.04	2.75	0.00	3.40	68.20	0.00	0.00	0.00	0.75	0.00
45829	1.17	0.00	24.61	1.34	0.00	11.54	60.09	0.00	0.00	1.25	0.00	0.00
46002	0.00	0.06	1.24	41.85	0.40	1.12	41.63	4.51	7.47	1.46	0.26	0.00
46003	0.00	0.00	0.00	30.15	0.00	0.47	26.37	0.00	30.62	12.38	0.00	0.00
46005	0.00	0.00	0.00	19.38	0.00	1.18	0.00	0.00	45.63	33.82	0.00	0.00
46006	0.00	0.00	0.00	26.51	1.21	6.87	14.28	0.00	14.67	36.45	0.00	0.00
46008	0.00	0.00	0.00	22.38	0.17	4.52	54.29	0.00	11.23	7.41	0.00	0.00
46812	0.00	3.25	11.38	27.97	0.00	0.00	57.40	0.00	0.00	0.00	0.00	0.00
46818	0.00	0.00	0.00	13.33	0.00	0.00	86.67	0.00	0.00	0.00	0.00	0.00
47001	0.00	0.00	0.00	6.05	1.84	6.09	81.87	0.00	3.03	1.12	0.00	0.00
47004	0.00	0.00	0.00	17.33	0.54	2.95	60.57	0.00	18.61	0.00	0.00	0.00
47005	0.00	0.00	0.00	0.32	2.25	8.77	84.33	0.00	3.79	0.54	0.00	0.00
47006	0.00	0.00	0.00	8.25	0.83	1.56	84.45	0.00	2.79	2.12	0.00	0.00
47007	0.00	0.00	0.00	16.22	3.45	9.73	45.61	0.00	12.24	10.91	1.85	0.00
47008	0.00	0.00	0.00	2.67	0.00	0.00	97.33	0.00	0.00	0.00	0.00	0.00
47009	0.00	0.00	0.00	15.71	0.00	0.00	84.29	0.00	0.00	0.00	0.00	0.00

STN NO	AREA	SAAR	PE	LOSSES	r	FALAKE
43005	323.7	768	523	428	0.82	0.000
43006	220.6	943	513	530	1.03	0.003
43007	1073.0	901	523	516	0.99	0.000
43008	445.4	845	512	559	1.09	0.000
43011	109.0	924	520			0.000
43012	112.4	945	500	644	1.29	0.001
43014	86.2	788	526	499	0.95	0.000
43017	76.0	762	526	490	0.93	0.000
43019	29.1	928	511	332	0.65	0.000
43021	1706.0	843	519			0.001
44001	414.4	1022	523	513	0.98	0.000
44002	183.1	1003	525	598	1.14	0.000
44003	49.1	975	527	601	1.14	0.000
44004	206.0	1071	522	610	1.17	0.000
44006	12.4	1098	523	635	1.21	0.000
44009	7.0	935	526			0.000
45001	600.9	1303	493	501	1.02	0.000
45002	421.7	1420	475	520	1.09	0.000
45003	226.1	996	532	473	0.89	0.000
45004	288.5	1052	523	509	0.97	0.000
45005	202.5	1020	536	533	1.00	0.001
45008	104.2	1070	527	442	0.84	0.000
45010	50.0	1344	482	646	1.34	0.000
45011	128.0	1669	451	582	1.29	0.000
45012	261.6	970	546	494	0.91	0.000
45829	34.4	954	547	574	1.05	0.000
46002	380.0	1225	522	460	0.88	0.002
46003	247.6	1696	488	291	0.60	0.001
46005	21.5	1987	454	221	0.49	0.000
46006	43.5	1727	506	402	0.80	0.000
46008	102.3	1596	530	622	1.17	0.001
46812	39.2	1131	540	461	0.85	0.000
46818	3.3	1313	535			0.000
47001	916.9	1240	525	465	0.89	0.000
47004	135.5	1504	518	479	0.92	0.000
47005	120.7	1207	519			0.000
47006	218.1	1296	518	573	1.11	0.000
47007	54.9	1477	535	544	1.02	0.000
47008	112.7	1227	525	552	1.05	0.000
47009	37.2	1349	538	598	1.11	0.000

STN NO	LF1	LF2	LF3	LF4	LF5	LF6	LF7	LF8	LF9	LF10	LF11	LF12
47014	0.00	0.00	0.00	43.20	0.00	0.48	19.81	0.00	16.58	19.93	0.00	0.00
47016	0.00	0.00	0.00	25.73	0.00	10.97	50.48	0.00	3.92	8.89	0.00	0.00
47017	0.00	0.00	0.00	1.62	0.00	0.00	98.38	0.00	0.00	0.00	0.00	0.00
48003	0.00	0.00	0.00	4.79	3.63	12.77	41.05	0.00	11.15	7.07	19.54	0.00
48004	0.00	0.00	0.00	23.07	0.00	1.68	16.83	0.00	50.73	7.69	0.00	0.00
48005	0.00	0.00	0.00	2.81	10.77	27.11	51.10	0.00	2.96	0.00	5.26	0.00
48006	0.00	0.00	0.00	70.54	2.21	4.71	7.91	0.00	12.80	1.82	0.00	0.00
48009	0.00	0.00	0.00	14.29	0.00	0.00	23.81	0.00	57.14	4.76	0.00	0.00
48010	0.00	0.00	0.00	17.41	1.09	2.05	70.62	0.00	8.82	0.00	0.00	0.00
49001	0.00	0.00	0.00	8.81	8.81	17.58	32.11	0.00	27.14	3.64	1.92	0.00
49002	0.00	0.00	0.00	25.87	5.43	13.85	51.47	0.00	3.38	0.00	0.00	0.00
49004	0.00	0.00	0.00	1.95	13.61	30.90	50.65	0.00	2.57	0.33	0.00	0.00
50002	0.00	0.33	1.27	1.93	0.67	2.60	85.70	2.09	1.51	3.90	0.00	0.00
50007	0.00	1.85	6.49	10.93	0.00	1.72	66.19	0.00	8.49	4.33	0.00	0.00
50807	0.00	0.55	1.92	15.83	0.00	0.00	56.84	0.00	12.44	12.42	0.00	0.00
50809	0.00	0.00	0.00	6.30	0.00	0.00	68.24	0.00	19.80	5.66	0.00	0.00
51001	0.00	2.67	21.17	15.81	3.01	1.52	49.85	2.67	3.29	0.00	0.00	0.00
51003	0.00	1.27	4.44	4.33	5.11	0.00	80.61	0.00	4.24	0.00	0.00	0.00
52003	0.00	2.84	21.66	3.37	6.93	2.74	61.94	0.00	0.52	0.00	0.00	0.00
52004	3.49	1.98	9.99	0.22	5.00	5.95	29.41	40.66	0.00	0.00	3.30	0.00
52007	0.00	18.01	17.59	0.66	0.00	0.00	7.42	52.38	0.00	0.00	3.95	0.00
52009	0.00	13.83	5.02	33.40	6.09	1.72	30.26	2.78	0.00	0.00	6.90	0.00
52010	0.00	22.84	11.89	0.82	0.26	2.50	16.25	44.70	0.00	0.00	0.75	0.00
52011	0.00	18.26	2.19	0.12	0.00	7.67	21.08	47.11	0.00	0.00	3.57	0.00
52015	0.00	5.93	4.79	46.44	3.80	7.62	23.08	8.35	0.00	0.00	0.00	0.00
52016	0.00	0.00	13.19	15.80	5.68	3.57	46.31	0.00	15.45	0.00	0.00	0.00
52020	2.21	4.57	3.11	0.00	0.00	1.73	10.59	77.79	0.00	0.00	0.00	0.00
53002	16.49	4.23	4.26	0.00	2.19	9.65	13.04	46.40	0.00	0.00	3.75	0.00
53005	0.00	37.15	3.88	0.52	1.04	1.45	25.52	26.36	0.00	0.00	4.08	0.00
53006	0.00	3.79	0.63	3.25	0.38	1.30	50.28	29.97	0.00	0.00	10.39	0.00
53007	2.59	19.94	2.95	16.75	2.33	2.00	12.29	39.44	0.19	0.00	1.51	0.00
53008	0.00	48.08	0.00	0.99	0.17	3.40	1.39	44.98	0.00	0.00	0.99	0.00
53009	0.00	48.10	5.65	1.05	0.32	0.00	17.16	22.24	0.00	0.00	5.48	0.00
53013	18.79	11.00	7.89	0.00	2.22	8.19	3.65	44.31	0.00	0.00	3.96	0.00
53017	0.00	29.56	1.35	0.00	0.00	0.00	25.18	43.91	0.00	0.00	0.00	0.00
53018	3.96	27.18	4.29	3.29	1.30	5.12	7.79	44.11	0.03	0.00	2.93	0.00
53019	0.00	11.32	0.00	0.00	0.70	3.60	3.34	81.03	0.00	0.00	0.00	0.00
53025	0.00	22.68	0.00	37.53	0.89	0.00	22.83	14.79	0.42	0.00	0.85	0.00
53026	0.00	6.40	0.46	6.10	0.00	2.44	51.97	25.30	0.00	0.00	7.32	0.00
53029	9.39	10.50	1.27	0.00	1.87	8.50	5.92	54.43	0.00	0.00	8.11	0.00

STN NO	AREA	SAAR	PE	LOSSES	r	FALAKE
47014	43.2	1665	487	367	0.75	0.000
47016	20.5	1310	525	545	1.04	0.000
47017	31.1	1242	525	461	0.88	0.000
48003	87.0	1230	539	512	0.95	0.000
48004	25.3	1512	515	505	0.98	0.000
48005	19.1	1107	548	481	0.88	0.000
48006	40.1	1209	547	390	0.71	0.000
48009	22.7	1622	510	523	1.03	0.005
48010	38.1	1396	533	557	1.04	0.000
49001	208.8	1351	518	462	0.89	0.002
49002	48.9	1049	549	412	0.75	0.005
49004	41.0	1064	546	531	0.97	0.000
50002	663.0	1208	533	465	0.87	0.000
50007	71.4	1243	527	423	0.80	0.000
50807	82.1	1571	502			0.000
50809	53.7	1368	491	431	0.88	0.000
51001	75.8	975	519	563	1.09	0.000
51003	36.3	1242	494	610	1.23	0.000
52003	87.8	889	526	499	0.95	0.000
52004	90.1	943	521	486	0.93	0.001
52007	74.8	887	524	414	0.79	0.000
52009	59.6	952	527	386	0.73	0.000
52010	135.2	881	526	444	0.84	0.001
52011	82.4	757	536	455	0.85	0.000
52015	23.3	897	530	559	1.05	0.000
52016	15.7	969	528	555	1.05	0.000
52020	16.4	1020	525	537	1.02	0.000
53002	157.7	756	524	468	0.89	0.000
53005	147.4	972	516	504	0.98	0.000
53006	148.9	796	528	436	0.82	0.000
53007	261.6	966	513	511	1.00	0.000
53008	303.0	836	517	516	1.00	0.000
53009	72.6	1018	515	462	0.90	0.000
53013	99.2	770	527	388	0.74	0.001
53017	48.0	807	513	429	0.84	0.000
53018	1552.0	840	520	516	0.99	0.000
53019	46.6	756	533	387	0.73	0.000
53025	119.0	1061	513	627	1.22	0.000
53026	78.5	805	525	389	0.74	0.000
53029		778	514			0.000

STN NO	LF1	LF2	LF3	LF4	LF5	LF6	LF7	LF8	LF9	LF10	LF11	LF12
54008	0.00	0.65	4.88	30.62	3.88	6.92	49.79	0.00	0.39	2.69	0.18	0.00
54010	0.00	14.06	1.20	0.00	0.51	0.40	3.40	80.44	0.00	0.00	0.00	0.00
54012	0.00	0.05	34.00	1.49	0.18	12.58	46.29	0.00	0.00	0.00	5.17	0.24
54014	0.00	0.00	0.62	1.83	0.00	5.04	70.63	0.00	7.68	13.68	0.52	0.00
54016	0.00	0.00	32.52	0.87	0.22	15.13	48.60	0.00	0.00	0.00	2.65	0.00
54017	0.00	1.57	10.40	13.97	0.16	0.55	72.03	0.98	0.00	0.00	0.35	0.00
54018	0.00	0.00	5.61	20.61	0.00	3.78	69.26	0.00	0.00	0.18	0.56	0.00
54019	0.00	1.20	3.24	0.39	0.19	12.61	51.59	25.59	0.00	0.00	5.19	0.00
54020	0.00	0.00	35.83	0.56	0.67	16.21	46.74	0.00	0.00	0.00	0.00	0.00
54022	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.48	38.52	0.00	0.00
54025	0.00	0.00	0.00	0.00	0.00	0.64	78.00	0.00	3.98	17.38	0.00	0.00
54027	0.00	67.06	0.19	0.00	0.00	0.00	7.27	22.00	0.00	0.00	3.48	0.00
54029	0.00	0.58	4.18	27.18	4.19	5.96	54.69	0.00	0.32	2.64	0.27	0.00
54034	0.00	0.00	0.00	70.69	0.78	0.00	28.53	0.00	0.00	0.00	0.00	0.00
54036	0.00	20.00	11.34	0.00	0.00	3.04	6.67	58.95	0.00	0.00	0.00	0.00
54038	0.00	0.00	0.76	0.62	0.27	1.39	75.82	0.00	11.35	9.79	0.00	0.00
54040	0.00	0.00	27.37	1.47	0.00	12.96	56.91	0.00	0.00	0.00	0.00	1.29
54041	0.00	0.00	45.17	3.44	0.36	7.53	42.98	0.00	0.00	0.00	0.51	0.00
54048	0.00	8.85	3.83	0.00	0.00	1.28	11.22	74.83	0.00	0.00	0.00	0.00
54052	0.00	0.00	27.86	0.00	0.00	11.97	60.17	0.00	0.00	0.00	0.00	0.00
54053	0.00	0.69	0.61	28.35	3.91	15.63	49.59	0.00	0.00	1.23	0.00	0.00
54054	0.00	1.32	3.92	37.45	0.00	2.37	54.93	0.00	0.00	0.00	0.00	0.00
54065	0.00	0.00	31.44	0.92	0.27	16.74	48.79	0.00	0.00	0.00	1.84	0.00
54084	0.00	3.71	0.00	20.99	0.00	0.00	74.38	0.93	0.00	0.00	0.00	0.00
54085	0.00	0.00	0.00	18.52	0.00	0.00	81.48	0.00	0.00	0.00	0.00	0.00
54087	0.00	0.00	66.67	0.00	0.00	13.45	19.88	0.00	0.00	0.00	0.00	0.00
54088	0.00	30.03	2.32	3.91	0.35	1.58	31.10	28.50	0.00	0.00	2.22	0.00
54090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	86.67	13.33	0.00	0.00
54091	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.89	51.11	0.00	0.00
54092	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.48	38.52	0.00	0.00
54094	0.00	0.18	23.07	0.70	0.19	16.19	34.28	0.00	0.00	0.00	24.61	0.79
55002	0.00	0.00	1.08	2.14	6.54	4.16	62.77	0.00	9.64	13.40	0.00	0.27
55003	0.00	0.12	2.88	15.03	17.48	8.23	54.25	0.00	1.66	0.35	0.00	0.00
55004	0.00	0.00	0.00	0.78	0.00	0.00	45.02	0.00	25.45	28.75	0.00	0.00
55005	0.00	0.00	0.00	0.32	0.00	1.26	52.69	0.00	24.26	21.48	0.00	0.00
55007	0.00	0.00	0.28	1.32	0.08	1.97	63.20	0.00	13.69	19.22	0.00	0.23
55008	0.00	0.00	0.00	0.00	0.00	0.00	9.09	0.00	71.92	18.99	0.00	0.00
55009	0.00	0.00	1.97	22.38	5.74	3.62	63.41	0.00	1.75	1.13	0.00	0.00
55010	0.00	0.00	0.00	0.00	0.00	0.00	20.00	0.00	66.82	13.18	0.00	0.00
55011	0.00	0.00	0.00	1.35	0.00	0.41	56.46	0.00	5.85	35.94	0.00	0.00

STN NO	AREA	SAAR	PE	LOSSES	r	FALAKE
54008	1134.4	878	453	474	1.05	0.000
54010	319.0	678	500	463	0.93	0.000
54012	852.0	718	519	452	0.87	0.001
54014	580.0	1235	447			0.007
54016	259.0	713	525	468	0.89	0.002
54017	293.0	713	515	492	0.96	0.000
54018	178.0	781	483	476	0.99	0.001
54019	347.0	692	499	460	0.92	0.003
54020	180.8	779	520	492	0.95	0.000
54022	8.7	2249	384	415	1.08	0.000
54025	52.7	1289	415	452	1.09	0.002
54027	198.0	888	500	506	1.01	0.007
54029	1480.0	853	459	484	1.05	0.000
54034	40.8	756	493	454	0.92	0.000
54036	90.7	737	513	517	1.01	0.000
54038	229.0	1292	437	400	0.91	0.000
54040	167.8	738	513	504	0.98	0.003
54041	192.0	754	523	466	0.89	0.001
54048	102.0	646	500	429	0.86	0.000
54052	34.4	737	526	445	0.85	0.000
54053	164.0	801	475			0.000
54054	235.0	842	436			0.000
54065	210.0	723	526			0.003
54084	31.5	950	497	615	1.24	0.000
54085	10.4	905	492			0.000
54087	4.7	702	523			0.000
54088	134.0	824	517	563	1.09	0.001
54090	0.9	2257	384			0.000
54091	3.6	2231	384			0.000
54092	3.2	2317	384			0.000
54094	134.0	693	507			0.000
55002	1895.9	1271	446	514	1.15	0.004
55003	885.8	882	481	501	1.04	0.001
55004	72.8	1903	427	514	1.20	0.000
55005	166.8	1634	408	464	1.14	0.001
55007	1282.1	1415	431	532	1.24	0.005
55008	10.6	2395	388	329	0.85	0.000
55009	357.4	1001	465			0.000
55010	27.2	2315	392	403	1.03	0.000
55011	111.4	1173	415	430	1.04	0.000

STN NO	LF1	LF2	LF3	LF4	LF5	LF6	LF7	LF8	LF9	LF10	LF11	LF12
55012	0.00	0.00	1.48	0.46	0.00	1.46	56.05	0.00	16.42	24.13	0.00	0.00
55013	0.00	0.00	0.00	15.18	20.62	2.94	55.10	0.00	4.74	1.42	0.00	0.00
55014	0.00	0.00	5.43	17.28	5.97	4.75	61.63	0.00	4.29	0.66	0.00	0.00
55016	0.00	0.00	0.00	1.53	0.00	2.28	78.49	0.00	3.51	14.19	0.00	0.00
55017	0.00	0.00	0.00	0.89	0.00	0.00	59.11	0.00	14.52	25.48	0.00	0.00
55018	0.00	0.00	0.41	16.14	0.43	3.40	79.63	0.00	0.00	0.00	0.00	0.00
55021	0.00	0.30	4.36	21.28	10.71	8.42	52.25	0.00	2.31	0.36	0.00	0.00
55022	0.00	0.00	0.43	12.38	2.86	2.85	81.49	0.00	0.00	0.00	0.00	0.00
55023	0.00	0.14	2.63	13.38	8.23	5.32	58.37	0.00	5.06	6.47	0.27	0.12
55025	0.00	0.00	0.66	8.89	8.34	1.56	77.55	0.00	0.00	1.52	0.00	1.48
55026	0.00	0.00	0.00	0.53	0.00	1.27	53.79	0.00	23.29	21.12	0.00	0.00
55028	0.00	0.00	0.77	17.86	0.00	0.00	81.37	0.00	0.00	0.00	0.00	0.00
55029	0.00	0.00	1.96	22.36	5.72	3.62	63.46	0.00	1.75	1.13	0.00	0.00
55031	0.00	0.00	0.00	3.12	45.83	1.43	49.62	0.00	0.00	0.00	0.00	0.00
55033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	71.56	28.44	0.00	0.00
55034	0.00	0.00	0.00	0.00	0.00	0.00	33.33	0.00	57.78	8.89	0.00	0.00
55035	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	86.67	13.33	0.00	0.00
56001	0.00	0.00	11.12	24.98	6.13	3.79	32.38	0.00	11.02	10.37	0.00	0.22
56002	0.00	0.00	0.23	29.00	0.60	1.51	27.88	0.00	10.92	12.43	17.43	0.00
56003	0.00	0.00	0.00	2.00	6.49	0.00	75.63	0.00	8.89	6.99	0.00	0.00
56004	0.00	0.00	12.89	5.46	8.40	1.86	44.72	0.00	13.59	12.72	0.00	0.36
56005	0.00	0.00	0.00	20.41	3.13	1.59	24.42	0.00	6.56	13.29	30.61	0.00
56006	0.00	0.00	9.72	0.00	7.98	0.00	47.17	0.00	13.03	21.56	0.00	0.54
56007	0.00	0.00	29.63	0.00	9.97	0.00	25.56	0.00	12.70	22.14	0.00	0.00
56008	0.00	0.00	5.00	66.67	15.00	0.00	13.33	0.00	0.00	0.00	0.00	0.00
56012	0.00	0.00	2.81	66.28	0.80	0.00	0.00	0.00	16.06	14.05	0.00	0.00
56013	0.00	0.00	0.00	0.62	7.12	0.17	65.62	0.00	15.04	11.43	0.00	0.00
56015	0.00	0.00	1.26	7.89	7.77	6.54	76.54	0.00	0.00	0.00	0.00	0.00
56017	0.00	0.00	0.00	17.89	4.34	3.79	19.24	0.00	13.24	31.74	9.76	0.00
57004	0.00	0.00	0.70	9.56	3.40	3.35	24.64	0.00	15.67	25.85	16.83	0.00
57005	0.00	0.00	1.16	11.66	2.25	2.69	14.78	0.00	20.09	31.50	15.87	0.00
57006	0.00	0.00	0.00	6.35	0.19	1.06	5.84	0.00	45.71	14.17	26.67	0.00
57007	0.00	0.00	1.94	12.10	2.78	3.14	10.75	0.00	12.46	46.73	10.10	0.00
57008	0.00	0.00	2.29	24.08	2.40	7.35	32.03	0.00	1.94	12.19	17.72	0.00
57009	0.00	1.34	13.59	10.85	2.42	22.45	23.74	0.34	1.34	17.90	6.04	0.00
57010	0.00	0.00	1.88	16.67	2.50	6.18	23.33	0.00	5.00	44.44	0.00	0.00
57011	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.33	46.67	0.00	0.00
57012	0.00	0.00	25.92	0.00	7.41	0.00	0.00	0.00	0.00	66.67	0.00	0.00
57015	0.00	0.00	2.14	7.17	4.85	1.98	2.77	0.00	16.78	58.82	5.50	0.00
58001	0.00	0.41	0.00	21.50	0.74	2.27	21.68	1.95	30.25	13.17	8.03	0.00

STN NO	AREA	SAAR	PE	LOSSES	r	FALAKE
55012	244.2	1643	441	322	0.73	0.000
55013	126.4	1086	459	480	1.05	0.000
55014	203.3	1064	444	455	1.03	0.000
55016	358.0	1129	436	337	0.77	0.000
55017	29.0	1411	448	362	0.81	0.000
55018	144.0	729	500	460	0.92	0.000
55021	371.0	948	466	453	0.97	0.001
55022	142.0	944	466	598	1.28	0.000
55023	4010.0	1055	465	496	1.07	0.002
55025	132.0	999	455	469	1.03	0.011
55026	174.0	1618	410	455	1.11	0.001
55028	77.7	744	499	440	0.88	0.000
55029	354.0	1001	465	474	1.02	0.000
55031	42.3	746	503	586	1.16	0.000
55033	3.9	2418	387			0.000
55034	3.1	2410	390			0.000
55035	1.1	2372	385			0.000
56001	911.7	1378	442	391	0.88	0.004
56002	216.5	1528	442	461	1.04	0.000
56003	62.1	1253	450	503	1.12	0.000
56004	543.9	1488	441			0.006
56005	98.1	1469	442	471	1.07	0.000
56006	183.8	1661	433	536	1.24	0.010
56007	19.9	1930	396	309	0.78	0.000
56008	15.4	1028	496			0.000
56012	82.2	1280	430	509	1.18	0.002
56013	62.8	1426	449	473	1.05	0.000
56015	105.1	1001	463			0.000
56017	42.5	1567	440			0.000
57004	106.0	1759	431	520	1.21	0.000
57005	454.8	1838	431	547	1.27	0.006
57006	100.5	2200	435	511	1.17	0.002
57007	194.5	1723	424	686	1.62	0.013
57008	178.7	1447	461	487	1.06	0.001
57009	145.0	1402	503	463	0.92	0.001
57010	39.4	1600	477	447	0.94	0.000
57011	5.1	2307	396			0.000
57012	4.3	1910	402			0.000
57015	104.1	1889	407	871	2.14	0.025
58001	158.0	1839	489	566	1.16	0.000

STN NO	LF1	LF2	LF3	LF4	LF5	LF6	LF7	LF8	LF9	LF10	LF11	LF12
58002	0.00	0.00	0.00	5.68	2.42	5.04	20.13	0.00	15.15	51.56	0.00	0.00
58005	0.00	0.00	0.00	20.47	0.00	1.90	16.37	0.00	46.06	15.20	0.00	0.00
58006	0.00	0.00	0.00	4.21	2.25	1.32	9.03	0.00	17.69	65.51	0.00	0.00
58008	0.00	0.00	0.00	6.17	0.44	7.90	17.83	0.00	22.22	45.44	0.00	0.00
58009	0.00	3.28	3.69	25.41	0.33	7.24	19.35	7.38	4.92	21.85	6.56	0.00
58010	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.82	85.18	0.00	0.00
58011	0.00	12.50	6.25	30.21	0.00	35.42	0.00	13.55	0.00	0.00	2.08	0.00
59001	0.00	0.00	0.00	11.27	2.52	4.27	17.20	0.00	14.09	44.90	5.75	0.00
59002	0.00	0.00	6.91	16.01	5.63	0.49	57.98	0.00	6.22	6.75	0.00	0.00
60002	0.00	0.00	1.49	0.13	0.00	1.24	74.55	0.00	10.20	12.39	0.00	0.00
60003	0.00	0.00	0.00	2.57	0.45	3.81	90.41	0.00	0.94	1.83	0.00	0.00
60004	0.00	0.00	0.00	3.25	0.00	0.00	91.01	0.00	2.30	3.44	0.00	0.00
60005	0.00	0.00	0.00	0.00	0.00	4.72	74.33	0.00	13.13	7.82	0.00	0.00
60006	0.00	0.00	0.00	0.41	0.00	0.08	89.85	0.00	3.55	6.11	0.00	0.00
60007	0.00	0.00	1.18	0.00	0.00	0.20	42.19	0.00	34.71	20.83	0.00	0.89
60009	0.00	0.00	0.00	3.75	4.08	0.00	55.46	0.00	18.06	18.65	0.00	0.00
60010	0.00	0.00	1.13	0.84	0.61	4.48	67.93	0.00	13.39	11.45	0.00	0.18
60012	0.00	0.00	0.00	0.00	0.00	2.12	49.70	0.00	20.64	27.55	0.00	0.00
60013	0.00	0.00	1.84	0.00	0.00	1.51	71.44	0.00	10.79	14.41	0.00	0.00
61002	0.00	0.00	5.04	4.69	0.00	3.75	69.85	0.00	5.17	11.51	0.00	0.00
61003	0.00	0.00	0.00	5.97	0.00	0.77	83.25	0.00	3.42	6.59	0.00	0.00
62001	0.00	0.00	1.79	5.01	0.00	4.26	72.12	0.00	6.76	10.06	0.00	0.00
62002	0.00	0.00	3.15	3.14	0.00	6.68	60.31	0.00	10.26	16.46	0.00	0.00
63001	0.00	0.00	0.00	3.15	0.00	4.28	63.33	0.00	15.33	13.92	0.00	0.00
63003	0.00	0.00	0.00	6.33	0.00	0.83	82.89	0.00	2.17	7.78	0.00	0.00
63005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	86.67	13.33	0.00	0.00
63006	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	86.67	13.33	0.00	0.00
64001	0.00	0.00	0.00	0.06	0.00	1.40	68.33	0.00	15.90	14.32	0.00	0.00
64002	0.00	0.00	2.31	3.41	0.00	2.89	25.98	0.00	32.86	32.55	0.00	0.00
64006	0.00	0.00	0.00	1.09	0.00	0.00	58.10	0.00	35.37	5.44	0.00	0.00
64007	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.11	88.89	0.00	0.00
64008	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00
65001	0.00	0.00	0.00	17.99	0.00	3.28	12.34	0.00	10.81	55.58	0.00	0.00
65004	0.00	0.00	3.12	1.19	2.50	8.02	25.48	0.00	24.82	32.78	2.08	0.00
65005	0.00	0.00	0.00	25.00	2.86	5.29	11.43	0.00	11.82	43.60	0.00	0.00
65006	0.00	0.00	13.82	8.06	1.05	6.66	17.37	0.00	21.32	25.14	6.58	0.00
65007	0.00	0.00	0.00	2.08	0.96	3.07	18.34	0.00	49.07	26.48	0.00	0.00
66001	0.00	0.00	9.23	8.12	8.27	7.68	61.08	0.00	2.42	1.99	1.22	0.00
66002	0.00	0.00	0.00	0.96	0.58	0.46	79.66	0.00	4.66	13.23	0.00	0.46
66004	0.00	0.00	15.00	20.92	34.03	5.72	24.32	0.00	0.00	0.00	0.00	0.00

STN NO	AREA	SAAR	PE	LOSSES	r	FALAKE
58002	190.9	1981	428	333	0.78	0.000
58005	74.3	2014	470	498	1.06	0.000
58006	65.8	2107	405	656	1.62	0.002
58008	43.0	1756	474	356	0.75	0.000
58009	62.5	1382	528	461	0.87	0.000
58010	11.0	2181	398			0.000
58011	49.2	1215	535	571	1.07	0.000
59001	227.7	1947	451	298	0.66	0.001
59002	46.4	1604	509	245	0.48	0.000
60002	297.8	1637	464	450	0.97	0.000
60003	217.3	1411	520	342	0.66	0.000
60004	40.1	1503	515	540	1.05	0.000
60005	66.8	1514	467	460	0.99	0.000
60006	129.5	1613	505	415	0.82	0.000
60007	231.8	1741	438			0.007
60009	81.1	1768	456			0.002
60010	1090.4	1586	472	451	0.96	0.002
60012	20.7	1677	446	609	1.37	0.000
60013	261.6	1636	457			0.000
61002	183.1	1447	509	430	0.84	0.009
61003	31.3	1465	488	364	0.75	0.000
62001	893.6	1364	486	360	0.74	0.001
62002	510.0	1418	465			0.001
63001	169.6	1496	461	402	0.87	0.003
63003	40.6	1254	504			0.000
63005	0.6	2271	399			0.000
63006	0.8	2105	412			0.000
64001	471.3	1836	420	298	0.71	0.001
64002	75.1	2024	395	159	0.40	0.012
64006	47.2	1504	482	768	1.59	0.005
64007	1.1	1787	428			0.000
64008	3.0	1817	405			0.000
65001	68.6	3030	327	363	1.11	0.020
65004	47.9	2416	375			0.021
65005	18.1	1528	499	460	0.92	0.000
65006	74.4	2298	390	327	0.84	0.020
65007	52.4	2143	443	623	1.41	0.002
66001	404.0	912	480	436	0.91	0.000
66002	220.0	1087	463	431	0.93	0.005
66004	62.9	852	491	490	1.00	0.002

STN NO	LF1	LF2	LF3	LF4	LF5	LF6	LF7	LF8	LF9	LF10	LF11	LF12
66005	0.00	0.00	3.85	8.87	9.28	3.77	64.14	0.00	2.05	5.07	2.97	0.00
66006	0.00	0.00	0.00	0.07	0.00	0.53	78.12	0.00	5.41	15.34	0.00	0.53
66011	0.00	0.00	0.44	1.82	0.00	1.06	28.29	0.00	21.03	47.06	0.29	0.00
67005	0.00	0.00	1.31	1.04	0.00	0.44	64.06	0.00	18.37	14.78	0.00	0.00
67008	0.00	0.00	10.91	14.12	17.04	4.96	43.74	0.00	4.55	0.73	3.96	0.00
67009	0.00	0.00	0.94	27.35	26.81	0.31	32.58	0.00	9.92	2.08	0.00	0.00
67010	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.26	89.74	0.00	0.00
67013	0.00	0.00	0.00	0.00	0.00	0.00	40.62	0.00	35.55	23.82	0.00	0.00
67016	0.00	0.00	14.51	0.00	0.00	6.40	77.69	0.00	0.00	0.00	1.40	0.00
67018	0.00	0.00	1.62	0.00	0.00	0.63	27.96	0.00	27.83	41.97	0.00	0.00
68001	0.00	0.00	17.94	0.49	0.06	16.38	61.35	0.00	0.00	0.00	3.78	0.00
68003	0.00	0.00	10.47	3.13	0.00	14.34	51.14	0.00	6.03	8.43	6.46	0.00
68004	0.00	0.00	23.16	1.55	0.00	17.24	43.32	0.00	0.00	0.00	14.74	0.00
68005	0.00	0.00	10.96	0.00	0.00	19.44	69.10	0.00	0.00	0.00	0.49	0.00
68006	0.00	0.00	3.59	7.91	0.00	4.97	43.14	0.00	15.27	20.27	4.85	0.00
68007	0.00	0.00	20.03	0.00	0.00	23.11	56.18	0.00	0.00	0.00	0.68	0.00
68011	0.00	0.00	2.03	0.00	0.00	11.49	86.49	0.00	0.00	0.00	0.00	0.00
68015	0.00	0.00	26.47	0.00	0.00	16.04	57.49	0.00	0.00	0.00	0.00	0.00
68020	0.00	0.00	29.95	1.32	0.00	11.41	57.32	0.00	0.00	0.00	0.00	0.00
69008	0.00	0.00	5.36	22.51	0.00	9.71	39.70	0.00	7.26	4.76	10.71	0.00
69012	0.00	0.00	20.65	11.92	0.00	13.14	31.38	0.00	2.43	1.64	18.83	0.00
69013	0.00	0.00	4.56	0.00	0.00	15.45	12.50	0.00	0.00	0.83	66.66	0.00
69017	0.00	0.00	0.08	32.07	0.35	0.72	31.08	0.00	16.60	18.56	0.54	0.00
69020	0.00	0.00	0.00	8.21	0.00	2.56	16.66	0.00	1.54	8.76	62.27	0.00
70002	0.00	0.00	4.53	10.57	0.00	5.31	37.58	0.00	0.42	11.75	29.33	0.52
70004	0.00	0.00	5.35	11.91	0.00	1.05	58.99	0.00	0.00	1.27	20.00	1.43
71001	0.00	0.00	1.14	5.91	2.10	5.61	45.92	0.00	6.90	27.87	4.54	0.00
71004	0.00	0.00	0.48	10.25	0.06	4.26	38.39	0.00	6.47	23.85	16.24	0.00
71006	0.00	0.00	2.59	3.89	4.31	5.97	46.10	0.00	5.44	31.70	0.00	0.00
71009	0.00	0.00	1.24	5.82	2.29	5.13	43.43	0.00	6.88	30.36	4.84	0.00
71010	0.00	0.00	0.00	5.56	0.00	6.57	34.55	0.00	4.43	33.43	15.45	0.00
71011	0.00	0.00	4.12	5.62	3.72	7.65	17.98	0.00	9.27	51.65	0.00	0.00
72001	0.00	0.00	3.54	6.69	4.28	6.39	31.02	0.00	11.25	36.83	0.00	0.00
72002	0.00	0.00	0.55	1.85	0.00	15.56	41.11	0.00	8.03	32.52	0.37	0.00
72004	0.00	0.00	3.49	6.66	4.27	6.20	31.02	0.00	11.32	37.04	0.00	0.00
72005	0.00	0.00	0.34	14.35	6.43	2.17	33.59	0.00	18.30	24.81	0.00	0.00
72007	0.00	0.00	0.00	3.41	0.00	5.72	15.15	0.00	14.77	60.94	0.00	0.00
72008	0.00	0.00	0.00	2.90	0.00	10.40	21.82	0.00	12.56	52.32	0.00	0.00
72009	0.00	0.00	1.42	4.35	7.38	4.02	39.67	0.00	14.56	28.61	0.00	0.00
72011	0.00	0.00	1.93	3.54	1.60	5.62	21.34	0.00	6.84	59.15	0.00	0.00

STN NO	AREA	SAAR	PE	LOSSES	r	FALAKE
66005	95.3	951	459			0.000
66006	194.0	1130	454	449	0.99	0.004
66011	344.5	2162	397	507	1.28	0.006
67005	113.7	1255	426	422	0.99	0.000
67008	227.1	901	475	569	1.20	0.001
67009	77.8	961	448			0.000
67010	13.1	2051	401	544	1.36	0.010
67013	33.9	1763	409	610	1.49	0.000
67016	142.1	739	542			0.002
67018	53.9	1924	402	117	0.29	0.000
68001	622.0	765	533	477	0.89	0.003
68003	407.1	883	504	456	0.91	0.001
68004	92.7	766	531	492	0.93	0.003
68005	207.0	756	531	505	0.95	0.007
68006	150.0	1053	462			0.003
68007	148.0	813	537			0.004
68011	36.5	801	548			0.000
68015	49.0	739	547	476	0.87	0.000
68020	156.0	725	549	473	0.86	0.000
69008	51.8	917	504			0.004
69012	72.5	924	499			0.003
69013	44.8	824	552			0.000
69017	183.0	1143	449	473	1.05	0.006
69020	57.5	1046	514	558	1.09	0.002
70002	198.0	1032	533			0.010
70004	74.4	1023	529	202	0.38	0.001
71001	1145.0	1322	482	402	0.83	0.004
71004	316.0	1211	488	370	0.76	0.006
71006	456.0	1345	467	416	0.89	0.000
71009	1053.0	1343	478	311	0.65	0.004
71010	108.0	1237	484	440	0.91	0.009
71011	204.0	1491	438	290	0.66	0.000
72001	994.6	1522	435	453	1.04	0.000
72002	275.0	1251	504	483	0.96	0.002
72004	983.0	1525	435	406	0.93	0.001
72005	219.0	1625	403	358	0.89	0.001
72007	32.0	1368	504			0.000
72008	114.0	1418	476	479	1.01	0.005
72009	142.0	1318	457	439	0.96	0.000
72011	200.0	1705	400			0.000

STN NO	LF1	LF2	LF3	LF4	LF5	LF6	LF7	LF8	LF9	LF10	LF11	LF12
72015	0.00	0.00	0.00	21.26	10.31	3.29	25.32	0.00	18.83	20.99	0.00	0.00
72804	0.00	0.00	0.34	14.35	6.43	2.17	33.59	0.00	18.30	24.81	0.00	0.00
72811	0.00	0.00	0.00	3.12	0.00	8.03	19.45	0.00	13.53	55.87	0.00	0.00
72814	0.00	0.00	0.00	4.41	0.00	3.92	17.65	0.00	19.12	54.90	0.00	0.00
72817	0.00	0.00	4.55	0.00	0.00	1.09	91.67	0.00	0.00	2.69	0.00	0.00
72818	0.00	0.00	2.27	0.00	0.00	12.67	83.70	0.00	0.00	1.35	0.00	0.00
72820	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00
73002	0.00	0.00	0.00	3.20	0.00	0.00	28.69	0.00	4.67	56.19	0.00	7.25
73003	0.00	0.00	2.81	6.71	0.00	2.19	45.79	0.00	3.06	39.44	0.00	0.00
73005	0.00	0.00	3.93	8.09	1.06	1.90	54.25	0.00	3.24	25.16	2.38	0.00
73008	0.00	0.00	2.80	13.61	1.81	4.83	62.19	0.00	5.82	8.94	0.00	0.00
73009	0.00	0.00	0.00	5.48	0.00	0.00	55.12	0.00	1.35	38.05	0.00	0.00
73010	0.00	0.00	0.00	10.35	0.00	0.91	43.51	0.00	1.41	36.06	0.00	7.76
73011	0.00	0.00	1.23	6.34	0.00	0.77	75.63	0.00	2.19	13.85	0.00	0.00
73013	0.00	0.00	0.00	12.90	0.00	0.00	32.26	0.00	0.54	54.30	0.00	0.00
74001	0.00	0.00	0.00	6.80	0.00	2.65	18.20	0.00	0.00	72.35	0.00	0.00
74002	0.00	0.00	4.66	7.64	0.00	0.00	13.28	0.00	0.00	67.44	0.00	6.98
74003	0.00	0.00	0.00	23.91	0.00	0.46	8.23	0.00	0.72	57.97	0.00	8.70
74005	0.00	0.00	9.87	14.09	2.45	4.67	35.33	0.00	2.10	26.78	1.57	3.14
74007	0.00	0.00	0.00	19.57	0.00	0.30	7.83	0.00	0.00	72.30	0.00	0.00
75002	0.00	0.00	3.37	3.40	3.78	1.60	58.69	0.00	5.15	21.01	0.30	2.70
75003	0.00	0.00	3.98	5.04	3.10	2.54	44.33	0.00	4.59	32.01	0.55	3.86
75004	0.00	0.00	0.00	1.36	1.53	0.00	70.00	0.00	6.72	17.00	0.00	3.39
75006	0.00	0.00	6.25	0.00	2.50	0.00	69.37	0.00	5.21	16.67	0.00	0.00
75007	0.00	0.00	0.70	4.46	7.57	1.73	48.04	0.00	5.21	32.30	0.00	0.00
75009	0.00	0.00	0.30	7.38	4.80	0.81	43.08	0.00	7.29	35.03	0.00	1.32
75010	0.00	0.00	15.39	4.85	6.49	0.81	57.64	0.00	11.23	3.59	0.00	0.00
75017	0.00	0.00	14.36	4.43	3.28	5.76	68.51	0.00	3.66	0.00	0.00	0.00
76002	0.00	0.00	16.91	8.45	5.71	6.86	36.06	0.00	2.86	21.53	0.44	1.17
76004	0.00	0.00	1.89	12.94	11.31	2.19	30.84	0.00	5.61	31.44	0.00	3.78
76005	0.00	0.00	8.99	8.86	8.08	8.07	41.70	0.00	3.07	21.22	0.00	0.00
76007	0.00	0.00	15.96	6.15	3.75	9.35	38.33	0.00	2.27	22.47	1.01	0.70
76008	0.00	0.00	8.11	0.00	0.00	12.21	24.17	0.00	0.00	55.52	0.00	0.00
76009	0.00	0.00	1.54	5.00	4.62	4.09	61.94	0.00	7.16	15.66	0.00	0.00
76010	0.00	0.00	31.20	8.87	0.00	15.69	43.60	0.00	0.00	0.00	0.63	0.00
76011	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00
76014	0.00	0.00	1.10	8.31	17.66	2.98	8.16	0.00	7.04	54.74	0.00	0.00
76805	0.00	0.00	0.00	35.28	22.22	0.00	0.00	0.00	42.50	0.00	0.00	0.00
77001	0.00	0.00	0.35	0.00	0.47	2.56	38.14	0.00	31.82	26.68	0.00	0.00
77002	0.00	0.00	0.29	0.00	0.82	2.81	33.07	0.00	47.13	15.89	0.00	0.00

STN NO	AREA	SAAR	PE	LOSSES	r	FALAKE
72015	141.5	1594	403			0.000
72804	222.0	1625	403			0.001
72811	37.3	1338	506			0.000
72814	18.5	1392	479			0.000
72817	31.9	1078	540			0.004
72818	64.5	1048	540			0.002
72820	0.7	1634	404			0.000
73002	73.0	2143	446	384	0.86	0.071
73003	73.6	1887	421	306	0.73	0.004
73005	209.0	1769	417	478	1.15	0.004
73008	131.0	1301	465	468	1.01	0.010
73009	34.6	2099	404	416	1.03	0.000
73010	247.0	2215	438	445	1.01	0.073
73011	65.8	1683	409	534	1.30	0.002
73013	64.0	2438	418			0.017
74001	85.7	2369	440	543	1.23	0.003
74002	44.2	2727	380	423	1.11	0.003
74003	44.2	2577	313	812	2.59	0.068
74005	125.5	1852	391	555	1.42	0.024
74007	70.2	2428	429	403	0.94	0.009
75002	663.0	1914	375	686	1.83	0.029
75003	363.0	2159	351	735	2.09	0.029
75004	116.6	2158	352	778	2.21	0.063
75006	33.9	2401	308	843	2.74	0.000
75007	64.5	1833	395	724	1.83	0.000
75009	145.6	2118	363	11	2.78	0.022
75010	27.7	1712	407			0.007
75017	96.0	1157	427	371	0.87	0.002
76002	1366.7	1327	404	534	1.32	0.009
76004	158.5	1788	405	109	2.74	0.024
76005	616.4	1216	407	485	1.19	0.000
76007	2286.5	1225	414	531	1.28	0.006
76008	334.6	1070	415	401	0.97	0.001
76009	147.2	1524	412	562	1.36	0.000
76010	160.0	942	441	536	1.22	0.001
76011	1.5	1163	402			0.000
76014	69.4	1376	399	222	0.56	0.000
76805	4.1	1508	408			0.000
77001	841.7	1449	411	520	1.27	0.000
77002	495.0	1507	410	431	1.05	0.001

STN NO	LF1	LF2	LF3	LF4	LF5	LF6	LF7	LF8	LF9	LF10	LF11	LF12
77003	0.00	0.00	0.00	0.00	0.00	1.57	40.73	0.00	12.10	45.61	0.00	0.00
77004	0.00	0.00	0.00	0.00	0.00	0.00	73.32	0.00	6.37	20.31	0.00	0.00
77005	0.00	0.00	0.83	0.00	0.00	8.32	34.86	0.00	0.00	55.98	0.00	0.00
78003	0.00	0.00	3.64	0.00	7.12	5.90	47.97	0.00	24.35	11.01	0.00	0.00
78004	0.00	0.00	0.00	0.00	8.03	4.05	27.12	0.00	42.49	18.31	0.00	0.00
78005	0.00	0.00	2.80	0.00	5.57	4.76	30.80	0.00	32.84	23.23	0.00	0.00
78006	0.00	0.00	0.45	0.00	0.89	4.95	46.11	0.00	36.77	10.83	0.00	0.00
79002	0.00	0.00	3.03	0.00	0.49	3.28	48.60	0.00	31.51	13.09	0.00	0.00
79003	0.00	0.00	1.51	0.00	1.25	6.03	41.98	0.00	24.25	24.98	0.00	0.00
79004	0.00	0.00	1.92	0.00	0.00	0.92	60.55	0.00	28.84	7.77	0.00	0.00
79005	0.00	0.00	5.47	0.00	0.21	3.42	59.24	0.00	25.78	5.88	0.00	0.00
79006	0.00	0.00	1.59	0.00	0.52	2.38	40.13	0.00	37.53	17.86	0.00	0.00
80001	0.00	0.00	3.26	0.00	0.51	1.92	51.92	0.00	20.13	22.26	0.00	0.00
80003	0.00	0.00	0.00	0.00	0.00	0.00	21.36	0.00	78.64	0.00	0.00	0.00
80004	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.33	66.67	0.00	0.00
80005	0.00	0.00	0.00	0.00	0.00	0.00	74.75	0.00	25.25	0.00	0.00	0.00
80006	0.00	0.00	0.00	0.00	0.00	0.00	21.78	0.00	46.97	25.00	0.00	6.25
81002	0.00	0.00	1.44	0.00	0.00	1.40	18.07	0.00	37.03	40.42	0.00	1.64
81003	0.00	0.00	2.02	0.00	0.00	1.45	11.67	0.00	16.16	68.70	0.00	0.00
81004	0.00	0.00	0.95	0.00	0.00	0.36	21.77	0.00	10.92	65.10	0.00	0.90
81005	0.00	0.00	12.54	0.00	0.00	2.50	75.00	0.00	0.00	9.96	0.00	0.00
81006	0.00	0.00	0.00	0.00	0.00	0.69	19.24	0.00	44.89	32.40	0.00	2.77
81007	0.00	0.00	3.01	0.00	0.00	0.00	24.32	0.00	34.75	36.63	0.00	1.28
82001	0.00	0.00	2.58	0.00	0.00	2.34	61.13	0.00	9.50	22.00	0.00	2.46
82003	0.00	0.00	0.00	0.00	3.06	3.09	39.44	0.00	15.09	39.33	0.00	0.00
83003	0.00	0.00	3.64	0.00	0.00	1.30	44.12	0.00	14.06	36.88	0.00	0.00
83004	0.00	0.00	2.88	0.00	0.00	1.51	47.31	0.00	5.88	42.42	0.00	0.00
83005	0.00	0.00	5.29	0.00	0.00	3.58	69.88	0.00	2.09	19.16	0.00	0.00
83006	0.00	0.00	2.31	0.00	0.00	1.19	60.59	0.00	6.56	29.34	0.00	0.00
83007	0.00	0.00	5.36	0.00	0.00	3.57	82.14	0.00	0.00	8.93	0.00	0.00
83008	0.00	0.00	2.15	0.00	0.00	0.00	77.41	0.00	4.01	13.19	0.00	3.23
83009	0.00	0.00	1.14	0.00	0.29	3.41	72.71	0.00	12.46	9.42	0.00	0.57
83010	0.00	0.00	18.77	0.00	0.00	3.15	41.10	0.00	2.08	34.91	0.00	0.00
84003	0.00	0.00	8.99	0.00	0.45	3.43	40.66	0.00	31.55	14.54	0.00	0.36
84004	0.00	0.00	8.28	0.00	0.40	4.41	32.19	0.00	40.28	13.91	0.00	0.53
84005	0.00	0.00	8.16	0.31	0.35	3.58	49.41	0.00	22.34	15.56	0.00	0.30
84012	0.00	0.00	3.09	0.00	0.00	7.52	71.50	0.00	7.58	8.10	0.00	2.21
84013	0.00	0.00	7.33	0.27	0.31	3.46	52.96	0.00	20.18	15.07	0.00	0.41
84014	0.00	0.00	10.34	0.00	0.00	3.06	52.31	0.00	6.10	28.19	0.00	0.00
84015	0.00	0.00	4.79	0.36	0.06	7.29	76.24	0.00	2.52	7.90	0.00	0.84

STN NO	AREA	SAAR	PE	LOSSES	r	FALAKE
77003	319.0	1401	407	388	0.95	0.000
77004	72.0	1226	449	415	0.92	0.000
77005	191.0	1133	424	221	0.52	0.000
78003	925.0	1446	430	482	1.12	0.002
78004	76.1	1551	429	471	1.10	0.000
78005	229.0	1548	434	440	1.01	0.000
78006	217.0	1629	397	325	0.82	0.001
79002	799.0	1547	409	508	1.24	0.001
79003	155.0	1565	407	460	1.13	0.005
79004	142.0	1732	406	536	1.32	0.000
79005	238.0	1461	432	442	1.02	0.002
79006	471.0	1579	402	504	1.25	0.002
80001	199.0	1352	446	429	0.96	0.010
80003	5.7	2147	400			0.000
80004	2.6	2210	400			0.000
80005	2.1	2176	398			0.000
80006	15.6	2182	399			0.059
81002	368.0	1716	418	393	0.94	0.008
81003	171.0	1420	492	323	0.66	0.005
81004	334.0	1322	478	341	0.71	0.009
81005	34.2	1100	499			0.000
81006	141.0	1949	400			0.010
81007		1834	421			0.000
82001	245.5	1327	454	504	1.11	0.004
82003	341.0	1499	455	518	1.14	0.003
83003	166.3	1279	427	340	0.80	0.001
83004	181.0	1291	437	344	0.79	0.001
83005	380.7	1212	461	438	0.95	0.003
83006	574.0	1221	446	363	0.81	0.001
83007	54.6	1286	469	313	0.67	0.002
83008	95.3	1272	461	166	0.36	0.008
83009	183.8	1518	457	400	0.88	0.006
83010	72.8	1356	450			0.000
84003	1092.9	1182	412	430	1.04	0.004
84004	741.8	1250	406	492	1.21	0.001
84005	1704.2	1152	424	397	0.94	0.002
84012	227.2	1276	450	343	0.76	0.018
84013	1903.1	1135	426	386	0.91	0.002
84014	265.5	1267	444	381	0.86	0.000
84015	235.4	1261	448	380	0.85	0.003

STN NO	LF1	LF2	LF3	LF4	LF5	LF6	LF7	LF8	LF9	LF10	LF11	LF12
84016	0.00	0.00	0.00	2.58	0.45	0.00	81.82	0.00	7.65	7.50	0.00	0.00
84018	0.00	0.00	8.26	0.00	0.31	4.01	36.51	0.00	35.79	14.70	0.00	0.43
84020	0.00	0.00	6.73	0.00	0.00	2.89	63.47	0.00	5.77	21.15	0.00	0.00
84022	0.00	0.00	0.00	0.00	0.90	3.64	25.03	0.00	44.95	25.48	0.00	0.00
84025	0.00	0.00	0.00	0.93	0.16	0.00	92.38	0.00	2.75	2.69	0.00	1.09
84026	0.00	0.00	0.00	0.00	0.00	0.00	67.74	0.00	19.69	9.34	0.00	3.23
84029	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00
84030	0.00	0.00	2.83	0.00	0.00	0.00	65.60	0.00	13.90	15.78	0.00	1.89
85001	0.00	0.00	3.67	0.13	2.05	3.32	39.55	0.00	23.55	18.07	0.00	9.65
85002	0.00	0.00	5.61	0.00	5.72	4.79	51.07	0.00	11.08	20.83	0.00	0.90
85003	0.00	0.00	0.00	0.00	0.00	0.00	31.59	0.00	45.53	22.88	0.00	0.00
85004	0.00	0.00	0.00	0.00	0.00	0.00	36.50	0.00	48.79	14.72	0.00	0.00
87801	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	70.00	30.00	0.00	0.00
89008	0.00	0.00	0.00	0.00	0.00	0.00	55.00	0.00	28.00	17.00	0.00	0.00
89009	0.00	0.00	0.00	0.00	0.00	0.00	20.56	0.00	52.95	26.50	0.00	0.00
89805	0.00	0.00	0.00	0.00	0.00	0.00	22.69	0.00	50.01	27.30	0.00	0.00
89807	0.00	0.00	0.00	0.00	0.00	0.00	3.40	0.00	60.78	35.82	0.00	0.00
90002	0.00	0.00	3.28	0.00	0.00	1.41	34.14	0.00	40.59	20.58	0.00	0.00
90003	0.00	0.00	0.00	0.00	0.00	0.00	49.43	0.00	33.06	17.52	0.00	0.00
93001	0.00	0.00	0.00	0.00	0.00	2.83	38.26	0.00	40.39	17.79	0.00	0.72
94001	0.00	0.00	0.00	0.00	0.00	1.13	24.08	0.00	34.75	31.94	0.00	8.11
95001	0.00	0.00	0.00	6.47	0.00	0.00	27.45	0.00	25.49	34.21	0.00	6.38
96001	0.00	0.00	0.69	0.00	0.00	0.29	0.00	0.00	33.94	64.60	0.00	0.49
96002	0.00	0.00	1.48	0.00	0.21	0.63	3.27	0.00	52.32	39.15	0.00	2.94
96003	0.00	0.00	0.61	0.00	0.00	1.05	0.00	0.00	37.67	58.93	0.00	1.74
97002	0.00	0.00	0.00	1.00	0.00	0.71	8.76	0.00	17.82	68.62	0.00	3.09
101005	4.35	0.00	42.60	2.66	0.00	0.00	38.64	11.74	0.00	0.00	0.00	0.00
101006	7.14	0.00	41.43	3.03	0.00	0.71	38.05	9.64	0.00	0.00	0.00	0.00
101007	0.00	0.00	70.00	0.00	0.00	0.00	25.00	5.00	0.00	0.00	0.00	0.00
201002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
201005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
201006	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
201007	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
201008	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
201009	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
201010	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
202002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
203010	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
203011	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
203012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

STN NO	AREA	SAAR	PE	LOSSES	r	FALAKE
84016	33.9	1066	451	268	0.59	0.000
84018	932.6	1226	408	404	0.99	0.001
84020	51.9	1552	430	376	0.87	0.000
84022	110.3	1331	401	482	1.20	0.000
84025	87.7	1045	453	184	0.41	0.004
84026	32.8	1383	450	127	0.28	0.015
84029	24.5	1097	444	390	0.88	0.000
84030	111.8	1329	449	289	0.64	0.012
85001	784.3	2041	405	402	0.99	0.092
85002	219.9	1436	426	421	0.99	0.009
85003	80.3	2761	309	604	1.95	0.002
85004	35.3	2442	400	18	0.05	0.000
87801	3.1	3449	391			0.000
89008	4.5	2767	326			0.000
89009	9.7	2484	358	85	0.24	0.000
89805	47.7	2654	340			0.003
89807	24.1	2490	399	256	0.64	0.021
90002	66.1	2692	330			0.003
90003	76.8	2685	307			0.000
93001	137.8	2498	311	19	0.06	0.013
94001	441.1	2340	312	271	0.87	0.089
95001	137.5	2024	340	94	0.28	0.070
96001	204.6	1063	397	296	0.75	0.009
96002	477.0	1483	335	462	1.38	0.028
96003	111.8	1102	397			0.017
97002	412.8	1020	398	362	0.91	0.017
101005	22.5	922	551	639	1.16	0.000
101006	15.8	914	551			0.000
101007	9.2	898	552			0.000
201002	161.2	1252	420	249	0.59	0.009
201005	274.6	1183	409	419	1.02	0.002
201006	324.6	1152	408	373	0.91	0.002
201007	145.3	1156	446	335	0.75	0.002
201008	337.3	1505	411	241	0.59	0.028
201009	442.4	1331	414	198	0.48	0.000
201010	1844.5	1260	416	326	0.78	0.007
202002	272.3	1176	447	218	0.49	0.000
203010	951.4	1032	435	466	1.07	0.003
203011	228.8	1271	423	471	1.11	0.000
203012	419.5	1132	434	482	1.11	0.000

STN NO	LF1	LF2	LF3	LF4	LF5	LF6	LF7	LF8	LF9	LF10	LF11	LF12
203013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
203017	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
203018	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
203019	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
203020	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
203021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
203024	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
203025	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
203026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
203028	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
203029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
203033	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
203042	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
204001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
205003	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
205004	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
205005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
205006	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
205008	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
205010	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
205020	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
206001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
206002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
236005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
236007	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

STN NO	AREA	SAAR	PE	LOSSES	r	FALAKE
203013	646.8	1202	427	454	1.06	0.000
203017	335.6	1068	442	587	1.33	0.005
203018	277.3	1108	436	429	0.98	0.000
203019	130.1	1127	451	352	0.78	0.001
203020	306.5	1229	440	406	0.92	0.007
203021	127.0	1228	421	425	1.01	0.000
203024	176.7	1020	446	439	0.98	0.000
203025	164.1	981	442	454	1.03	0.008
203026	44.6	1027	448	494	1.10	0.015
203028	98.9	1276	439	379	0.86	0.000
203029	58.4	1203	423	333	0.79	0.001
203033	100.9	1337	414	505	1.22	0.012
203042	54.1	1012	448	390	0.87	0.000
204001	306.1	1156	441	446	1.01	0.000
205003	444.7	944	448	441	0.99	0.003
205004	490.4	947	449	373	0.83	0.003
205005	69.5	935	449	479	1.07	0.016
205006	315.9	937	448	488	1.09	0.002
205008	85.2	1081	429	402	0.94	0.003
205010	189.8	984	443	545	1.23	0.002
205020	58.4	962	452			0.000
206001	132.7	1057	448			0.003
206002	32.4	934	457	217	0.47	0.008
236005	309.1	1135	426	445	1.04	0.002
236007	167.6	1366	432	510	1.18	0.012

Appendix 4 Soil associations

SURVEY	E - England and Wales S - Scotland NI - Northern Ireland	
SOIL ASSOCIATION and UNIT NAME	from SSLRC and MLURI classification	
Q95(1)	95 percentile 1-day flow, % mean flow	
MAM(7)	Mean annual 7-day minimum flow, % mean flow	

In Northern Ireland Q95(1) and MAM(7) are estimated directly from HOST classes.

SURVEY	SOIL ASSOCIATION	UNIT NAME	Q95(1)	MAM(7)
E	22	UNRIPENED GLEY SOILS	6.5	1.4
E	92a	DISTURBED SOILS1	10.7	12.4
E	92b	DISTURBED SOILS2	10.7	12.4
E	92c	DISTURBED SOILS3	10.7	12.4
E	311a	REVIDGE	10.3	9.5
E	311b	SKIDDAW	9.5	8.7
E	311c	WETTON1	19.2	19.9
E	311d	WETTON2	17.3	17.4
E	311e	BANGOR	6.8	5.9
E	313a	DUNWELL	10.0	11.3
E	313b	POWYS	10.7	12.4
E	313c	CRWBIN	25.0	27.5
E	341	ICKNIELD	41.2	50.9
E	342a	UPTON1	40.8	50.8
E	342b	UPTON2	40.8	50.8
E	342c	WANTAGE1	41.7	51.1
E	342d	WANTAGE2	30.2	35.6
E	343a	ELMTON1	31.9	40.3
E	343b	ELMTON2	31.2	39.0
E	343c	Elmton3	18.4	22.7
E	343d	SHERBORNE	25.1	31.4
E	343e	MARCHAM	31.9	40.3
E	343f	NEWMARKET1	40.8	50.8
E	343g	Newmarket2	38.3	47.1
E	343h	ANDOVER1	41.6	51.1
E	343i	ANDOVER2	42.0	51.2
E	346	Reach	6.5	1.4
E	361	Sandwich	23.1	24.8
E	372	Willingham	6.5	1.4
E	411a	Evesham1	10.2	11.9
E	411b	EVESHAM2	1.1	0.1
E	411c	EVESHAM3	1.1	0.1
E	411d	HANSLOPE	10.7	12.4
E	421a	STOW	5.4	5.6
E	421b	HALSTOW	10.7	12.4
E	431	WORCESTER	10.7	12.4
E	511a	ABERFORD	33.7	41.7
E	511b	Moreton	21.4	26.6
E	511c	PANHOLES	41.6	51.1
E	511d	Blewbury	43.4	51.6
E	511e	SWAFFHAM PRIOR	40.8	50.8
E	511f	COOMBE1	42.6	51.4
E	511g	COOMBE2	40.8	50.8
E	511h	BADSEY1	20.9	21.7
E	511i	BADSEY2	21.1	22.0
E	511j	STRETHAM	10.7	12.4
E	512a	ASWARBY	29.1	32.3
E	512b	LANDBEACH	9.1	5.0
E	512c	RUSKINGTON	6.5	1.4
E	512d	GROVE	4.6	0.9

SURVEY	SOIL ASSOCIATION	UNIT NAME	Q95(1)	MAM(7)
E	512e	BLOCK	6.5	1.4
E	512f	Milton	10.2	6.6
E	513	CANNAMORE	10.7	12.4
E	521	METHWOLD	40.8	50.8
E	532a	BLACKTOFT	6.5	1.4
E	532b	ROMNEY	6.5	1.4
E	541a	MILFORD	14.7	16.7
E	541b	BROMSGROVE	52.0	56.6
E	541c	EARDISTON1	28.5	31.3
E	541d	EARDISTON2	25.0	27.5
E	541e	CREDITON	58.2	64.4
E	541f	RIVINGTON1	33.0	36.1
E	541g	RIVINGTON2	22.6	25.0
E	541h	NEATH	10.7	12.4
E	541i	MUNSLOW	25.0	27.5
E	541j	DENBIGH1	12.6	14.4
E	541k	DENBIGH2	16.4	16.2
E	541l	BARTON	22.6	25.0
E	541m	SOUTH PETHERTON	54.7	59.5
E	541n	Trusham	20.4	22.7
E	541o	MALHAM1	16.5	16.4
E	541p	MALHAM2	25.0	27.5
E	541q	WALTHAM	35.7	39.0
E	541r	WICK1	20.4	21.0
E	541s	WICK2	35.6	38.3
E	541t	WICK3	31.7	34.7
E	541u	ELLERBECK	25.0	27.5
E	541v	RHEIDOL	22.9	24.6
E	541w	NEWNHAM	19.7	20.0
E	541x	EAST KESWICK1	30.5	32.8
E	541y	EAST KESWICK2	37.7	41.3
E	541z	EAST KESWICK3	40.0	43.7
E	541A	BEARSTED1	56.4	60.3
E	541B	BEARSTED2	38.6	40.3
E	541C	NEWBIGGIN	35.6	39.1
E	541D	OGLETHORPE	30.3	33.3
E	542	NERCWYS	10.7	12.4
E	543	ARROW	6.5	1.4
E	544	BANBURY	26.8	33.6
E	551a	BRIDGNORTH	61.4	66.7
E	551b	CUCKNEY1	47.4	51.6
E	551c	CUCKNEY2	38.8	41.0
E	551d	NEWPORT1	20.9	22.4
E	551e	NEWPORT2	35.9	39.2
E	551f	Newport3	19.3	21.5
E	551g	NEWPORT4	25.0	27.5
E	552a	KEXBY	12.7	10.1
E	552b	Ollerton	16.6	16.1
E	554a	FRILFORD	63.9	69.4
E	554b	WORLINGTON	30.0	36.1

SURVEY	SOIL ASSOCIATION	UNIT NAME	Q95(1)	MAM(7)
E	555	Downham	26.1	26.1
E	561a	WHARFE	6.5	1.4
E	561b	TEME	6.5	1.4
E	561c	ALUN	6.5	1.4
E	561d	LUGWARDINE	6.5	1.4
E	571a	STON EASTON	25.6	31.5
E	571b	BROMYARD	12.9	14.8
E	571c	MALLING	26.7	31.1
E	571d	FYFIELD1	47.4	51.7
E	571e	FYFIELD2	65.7	71.3
E	571f	FYFIELD3	54.4	58.7
E	571g	FYFIELD4	48.7	53.0
E	571h	ARDINGTON	23.6	26.3
E	571i	HARWELL	12.1	13.9
E	571j	FRILSHAM	40.8	50.8
E	571k	MOULTON	37.6	46.1
E	571l	CHARITY1	45.7	52.4
E	571m	CHARITY2	44.2	51.9
E	571n	TATHWELL	37.6	46.8
E	571o	MELFORD	40.8	50.8
E	571p	ESCRICK1	34.6	38.0
E	571q	ESCRICK2	36.5	40.0
E	571r	HUNSTANTON	39.6	47.5
E	571s	EFFORD1	31.1	32.8
E	571t	Efford2	13.7	14.4
E	571u	SUTTON1	25.0	27.5
E	571v	SUTTON2	30.3	33.3
E	571w	Hucklesbrook	23.2	24.9
E	571x	Ludford	31.4	34.4
E	571y	HAMBLE1	28.9	31.0
E	571z	HAMBLE2	29.2	29.1
E	571A	Rowton	18.3	20.5
E	572a	YELD	17.8	21.1
E	572b	MIDDLETON	10.7	12.4
E	572c	HODNET	21.7	24.1
E	572d	Whimple1	26.9	29.7
E	572e	WHIMPLE2	23.6	26.3
E	572f	WHIMPLE3	10.7	12.4
E	572g	DUNNINGTON HEATH	10.7	12.4
E	572h	OXPASTURE	1.1	0.1
E	572i	CURTISDEN	15.9	18.0
E	572j	Bursledon	13.6	13.8
E	572k	BIGNOR	12.3	14.1
E	572l	FLINT	10.7	12.4
E	572m	SALWICK	13.4	14.0
E	572n	BURLINGHAM1	16.1	18.1
E	572o	BURLINGHAM2	16.7	18.9
E	572p	BURLINGHAM3	24.0	28.5
E	572q	ASHLEY	10.7	12.4
E	572r	Ratsborough	8.1	9.1

SURVEY	SOIL ASSOCIATION	UNIT NAME	Q95(1)	MAM(7)
E	572s	Bishampton1	23.8	26.4
E	572t	BISHAMPTON2	8.0	9.0
E	573a	WATERSTOCK	16.2	13.6
E	573b	Wix	10.2	7.4
E	581a	NORDRACH	25.0	27.5
E	581b	SONNING1	23.4	25.8
E	581c	SONNING2	17.2	18.8
E	581d	CARSTENS	41.7	51.1
E	581e	MARLOW	32.8	40.6
E	581f	BARROW	33.7	40.3
E	581g	STONE STREET	45.2	51.0
E	582a	BATCOMBE	16.3	19.6
E	582b	Hornbeam1	24.4	28.7
E	582c	HORNBEAM2	22.0	26.8
E	582d	HORNBEAM3	10.7	12.4
E	582e	TENDRING	13.4	12.3
E	611a	MALVERN	14.8	16.7
E	611b	MORETONHAMPSTEAD	25.0	27.5
E	611c	MANOD	10.7	12.4
E	611d	WITHNELL1	18.6	20.8
E	611e	WITHNELL2	22.6	25.0
E	612a	PARC	10.5	11.5
E	612b	MOOR GATE	23.8	25.9
E	631a	ANGLEZARKE	21.0	22.3
E	631b	DELAMERE	65.7	71.3
E	631c	SHIRRELL HEATH1	40.6	43.0
E	631d	SHIRRELL HEATH2	65.7	71.3
E	631e	GOLDSTONE	57.0	61.9
E	631f	CRANNYMOOR	20.0	20.4
E	633	LARKBARROW	20.1	21.0
E	634	SOUTHAMPTON	23.1	25.5
E	641a	SOLLOM1	12.3	9.6
E	641b	Sollom2	22.4	21.7
E	641c	HOLME MOOR	8.8	4.7
E	643a	Holidays Hill	25.4	26.9
E	643b	Poundgate	10.2	11.6
E	643c	Bolderwood	13.1	14.9
E	643d	Felthorpe	6.5	1.4
E	651a	BELMONT	16.9	16.9
E	651b	HEXWORTHY	15.0	14.4
E	651c	EARLE	12.4	11.7
E	652	MAW	15.0	14.4
E	654a	HAFREN	13.9	13.3
E	654b	LYDCOTT	14.1	13.5
E	654c	GELLIGAER	15.0	14.4
E	711a	STANWAY	10.7	12.4
E	711b	BROCKHURST1	10.7	12.4
E	711c	BROCKHURST2	10.1	10.9
E	711d	MARTOCK	10.7	12.4
E	711e	WICKHAM1	2.8	2.3

SURVEY	SOIL ASSOCIATION	UNIT NAME	Q95(1)	MAM(7)
E	711f	WICKHAM2	1.1	0.1
E	711g	WICKHAM3	3.0	1.6
E	711h	WICKHAM4	1.1	0.1
E	711i	WICKHAM5	3.6	3.3
E	711j	KINGSTON	20.4	22.8
E	711k	VERNOLDS	9.8	10.0
E	711l	CLAVERLEY	10.7	12.4
E	711m	SALOP	10.7	12.4
E	711n	CLIFTON	10.3	11.2
E	711o	RUFFORD	8.8	7.5
E	711p	DUNKESWICK	10.7	12.4
E	711q	PINDER	10.7	12.4
E	711r	BECCLES1	10.7	12.4
E	711S	BECCLES2	10.0	10.7
E	711t	BECCLES3	10.7	12.4
E	711u	HOLDERNESS	10.7	12.4
E	711v	GRESHAM	10.0	10.7
E	711w	CROFT PASCOE	19.0	19.9
E	712a	DALE	10.7	12.4
E	712b	DENCHWORTH	1.1	0.1
E	712c	WINDSOR	1.1	0.1
E	712d	HALLSWORTH1	10.7	12.4
E	712e	HALLSWORTH2	10.7	12.4
E	712f	CREWE	10.7	12.4
E	712g	RAGDALE	10.7	12.4
E	712h	FOGGATHORPE1	10.7	12.4
E	712i	FOGGATHORPE2	10.7	12.4
E	713a	BARDSEY	14.9	16.8
E	713b	SPORTSMANS	9.7	8.0
E	713c	FFOREST	10.3	11.7
E	713d	CEGIN	10.7	12.4
E	713e	BRICKFIELD1	9.5	10.4
E	713f	BRICKFIELD2	18.4	20.6
E	713g	BRICKFIELD3	10.7	12.4
E	714a	DUNKESWELL	9.7	10.7
E	714b	OAK1	10.7	12.4
E	714c	OAK2	10.7	12.4
E	714d	ESSENDEN	8.8	9.9
E	721a	PRINCETOWN	15.0	14.4
E	721b	ONECOTE	6.8	5.9
E	721c	WILCOCKS1	6.8	5.4
E	721d	WILCOCKS2	7.7	6.8
E	721e	WENALLT	6.8	5.9
E	811a	ENBORNE	6.5	1.4
E	811b	CONWAY	6.5	1.4
E	811c	HOLLINGTON	6.5	1.4
E	811d	ROCKCLIFFE	6.5	1.4
E	811e	TANVATS	6.5	1.4
E	812a	FROME	6.5	1.4
E	812b	WISBECH	6.5	1.4

SURVEY	SOIL ASSOCIATION	UNIT NAME	Q95(1)	MAM(7)
E	812c	AGNEY	6.5	1.4
E	813a	MIDELNEY	6.5	1.4
E	813b	FLADBURY1	6.5	1.4
E	813c	FLADBURY2	6.5	1.4
E	813d	FLADBURY3	6.5	1.4
E	813e	COMPTON	6.5	1.4
E	813f	WALLASEA1	6.5	1.4
E	813g	WALLASEA2	6.5	1.4
E	813h	Dowels	6.5	1.4
E	814a	THAMES	6.5	1.4
E	814b	Newchurch1	6.5	1.4
E	814c	NEWCHURCH2	6.5	1.4
E	815	NORMOOR	6.5	1.4
E	821a	EVERINGHAM	6.5	1.4
E	821b	BLACKWOOD	6.5	1.4
E	831a	YEOLLANDPARK	7.0	2.7
E	831b	SESSAY	7.8	4.7
E	831c	WIGTON MOOR	6.5	1.4
E	832	KELMSCOT	6.5	1.4
E	841a	Curdridge	5.4	1.1
E	841b	HURST	6.5	1.4
E	841c	SWANWICK	6.5	1.4
E	841d	SHABBINGTON	5.8	1.2
E	841e	PARK GATE	6.5	1.4
E	851a	DOWNHOLLAND1	6.5	1.4
E	851b	DOWNHOLLAND2	6.5	1.4
E	851c	DOWNHOLLAND3	6.5	1.4
E	861a	Isleham1	6.6	2.3
E	861b	Isleham2	6.5	1.4
E	871a	LAPLOYD	6.7	4.8
E	871b	HENSE	12.5	9.3
E	871c	HANWORTH	6.5	1.4
E	872a	PEACOCK	2.8	0.5
E	872b	Clayhythe	5.9	1.3
E	873	IRETON	6.5	1.4
E	1011a	LONGMOSS	6.8	5.9
E	1011b	WINTER HILL	6.8	5.9
E	1013a	CROWDY1	7.7	6.8
E	1013b	CROWDY2	6.8	5.9
E	1021	TURBARY MOOR	6.6	2.3
E	1022a	ALTCAR1	6.5	1.4
E	1022b	ALTCAR2	6.5	1.4
E	1024a	ADVENTURERS'1	6.5	1.4
E	1024b	ADVENTURERS'2	6.5	1.4
E	1024c	ADVENTURERS'3	6.5	1.4
E	1025	Mendham	6.5	1.4
S	1	ALLUVIAL SOILS	6.5	1.4
S	2	ALLUVIAL SOILS	6.5	1.4
S	3	ORGANIC SOILS	6.8	5.9
S	4	ORGANIC SOILS	6.8	5.9

SURVEY	SOIL ASSOCIATION	UNIT NAME	Q95(1)	MAM(7)
S	5	ABERLOUR	12.0	13.0
S	6	ABERLOUR	26.0	28.8
S	7	ABERLOUR	10.9	10.2
S	9	ABERLOUR	12.1	11.4
S	10	ABERLOUR	12.9	13.4
S	11	ABERLOUR	10.9	10.2
S	12	ABERLOUR	10.7	12.4
S	13	ABERLOUR	8.8	9.2
S	14	ABERLOUR	10.7	12.4
S	15	ABERLOUR	9.7	10.8
S	16	ARBIGLAND	10.7	12.4
S	17	ARDVANIE	25.0	27.5
S	18	ARKAIG	10.7	12.4
S	19	ARKAIG	12.8	13.4
S	20	ARKAIG	29.7	32.7
S	21	ARKAIG	15.0	14.4
S	22	ARKAIG	10.9	10.2
S	23	ARKAIG	12.1	11.4
S	24	ARKAIG	15.0	14.4
S	25	ARKAIG	10.7	12.4
S	26	ARKAIG	12.1	11.4
S	27	ARKAIG	10.7	12.4
S	28	ARKAIG	12.9	13.4
S	29	ARKAIG	10.9	10.2
S	30	ARKAIG	11.9	11.8
S	31	ARKAIG	12.5	11.9
S	32	ARKAIG	9.7	8.9
S	33	ARKAIG	10.7	12.4
S	34	ARKAIG	8.8	9.2
S	35	ARKAIG	10.7	12.4
S	36	ARKAIG	8.7	9.1
S	37	ARRAN	10.7	12.4
S	38	ARRAN	6.8	5.9
S	39	ASHGROVE	10.7	12.4
S	40	ASHGROVE	10.7	12.4
S	41	BALROWNIE	10.7	12.4
S	42	BALROWNIE	10.7	12.4
S	43	BALROWNIE	25.0	27.5
S	44	BALROWNIE	29.7	32.7
S	45	BALROWNIE	15.0	14.4
S	46	BALROWNIE	6.8	5.9
S	47	BALROWNIE	10.7	12.4
S	48	BALROWNIE	6.8	5.9
S	49	BALROWNIE	10.7	12.4
S	50	BALROWNIE	6.8	5.9
S	51	BARGOUR	10.7	12.4
S	52	BARNCORKRIE	10.7	12.4
S	53	BEMERSYDE	10.7	12.4
S	54	BEMERSYDE	10.7	12.4
S	55	BEMERSYDE	15.0	14.4

SURVEY	SOIL ASSOCIATION	UNIT NAME	Q95(1)	MAM(7)
S	56	BENAN	10.7	12.4
S	57	BENAN	10.7	12.4
S	58	BENAN	10.7	12.4
S	59	BERRIEDALE	10.7	12.4
S	60	BERRIEDALE	10.7	12.4
S	61	BERRIEDALE	12.5	11.9
S	62	BERRIEDALE	10.9	10.2
S	63	BERRIEDALE	10.7	12.4
S	64	BERRIEDALE	13.4	12.7
S	65	BERRIEDALE	15.0	14.4
S	66	BERRIEDALE	15.6	17.6
S	67	BERRIEDALE	8.8	9.2
S	68	BLAIR	10.7	12.4
S	69	BLAIR	8.2	8.2
S	70	BOGTOWN	10.7	12.4
S	71	BRAEMORE	29.7	32.7
S	72	BRAEMORE	23.9	26.5
S	73	BRAEMORE	10.7	12.4
S	74	BRAEMORE	10.7	12.4
S	75	BRAEMORE	9.6	8.8
S	76	BRIGHTMONY	25.0	27.5
S	77	CAIRNCROSS	10.7	12.4
S	78	CANISBAY	10.7	12.4
S	79	CANISBAY	10.1	11.4
S	80	CANISBAY	10.8	11.5
S	81	CANISBAY	15.0	14.4
S	82	CANISBAY	6.8	5.9
S	83	CANISBAY	10.7	12.4
S	84	CANONBIE	10.7	12.4
S	85	CANONBIE	10.7	12.4
S	86	CANONBIE	10.7	12.4
S	87	CANONBIE	6.8	5.9
S	88	CANONBIE	6.8	5.9
S	89	CARPOW	25.0	27.5
S	90	CARTER	10.7	12.4
S	91	CARTER	10.7	12.4
S	92	CARTER	10.7	12.4
S	93	CARTER	15.0	14.4
S	94	CARTER	8.7	9.1
S	95	CARTER	6.8	5.9
S	96	CORBY	10.7	12.4
S	97	CORBY	25.0	27.5
S	98	CORBY	19.5	19.7
S	99	CORBY	25.0	27.5
S	100	CORBY	25.0	27.5
S	101	CORBY	15.0	14.4
S	102	CORBY	9.6	7.5
S	103	CORBY	16.0	16.8
S	104	CORBY	8.0	7.2
S	105	CORBY	20.1	21.0

SURVEY	SOIL ASSOCIATION	UNIT NAME	Q95(1)	MAM(7)
S	106	CORBY	10.9	10.1
S	107	CORRIEBRECK	10.7	12.4
S	108	CORRIEBRECK	10.7	12.4
S	109	CORRIEBRECK	12.5	11.9
S	110	CORRIEBRECK	15.0	14.4
S	111	CORRIEBRECK	10.9	10.2
S	112	CORRIEBRECK	10.7	12.4
S	113	COUNTESSWELLS	10.7	12.4
S	114	COUNTESSWELLS	10.7	12.4
S	115	COUNTESSWELLS	10.7	12.4
S	116	COUNTESSWELLS	10.7	12.4
S	117	COUNTESSWELLS	15.0	14.4
S	118	COUNTESSWELLS	10.9	10.2
S	119	COUNTESSWELLS	10.9	10.2
S	120	COUNTESSWELLS	10.9	10.2
S	121	COUNTESSWELLS	10.7	12.4
S	122	COUNTESSWELLS	10.7	12.4
S	123	COUNTESSWELLS	12.1	11.4
S	124	COUNTESSWELLS	6.8	5.9
S	125	COUNTESSWELLS	10.7	12.4
S	126	COUNTESSWELLS	12.9	13.4
S	127	COUNTESSWELLS	10.9	10.2
S	128	COUNTESSWELLS	10.7	12.4
S	129	COUNTESSWELLS	10.9	10.1
S	130	COUNTESSWELLS	12.5	11.9
S	131	COUNTESSWELLS	12.5	11.9
S	132	COUNTESSWELLS	10.9	10.2
S	133	COUNTESSWELLS	6.8	5.9
S	134	COUNTESSWELLS	10.7	12.4
S	135	COUNTESSWELLS	8.8	9.2
S	136	COUNTESSWELLS	10.7	12.4
S	137	COUNTESSWELLS	10.7	12.4
S	138	CRAIGDALE	12.8	13.4
S	139	CRAIGDALE	8.8	9.2
S	140	CRAIGELLACHIE	10.7	12.4
S	141	CREETOWN	10.7	12.4
S	142	CREETOWN	10.7	12.4
S	143	CREETOWN	8.8	9.2
S	144	CROMARTY	49.0	53.4
S	145	CROMARTY	10.7	12.4
S	146	CROMARTY	12.9	13.4
S	147	DARLEITH	10.7	12.4
S	148	DARLEITH	10.7	12.4
S	149	DARLEITH	10.7	12.4
S	150	DARLEITH	10.7	12.4
S	151	DARLEITH	10.7	12.4
S	152	DARLEITH	12.9	13.4
S	153	DARLEITH	15.0	14.4
S	154	DARLEITH	12.5	11.9
S	155	DARLEITH	10.9	10.2

SURVEY	SOIL ASSOCIATION	UNIT NAME	Q95(1)	MAM(7)
S	156	DARLEITH	12.8	13.4
S	157	DARLEITH	12.1	11.4
S	158	DARLEITH	10.7	12.4
S	159	DARLEITH	12.9	13.4
S	160	DARLEITH	10.9	10.2
S	161	DARLEITH	10.7	12.4
S	162	DARLEITH	8.8	9.2
S	163	DARVEL	25.0	27.5
S	164	DARVEL	19.5	19.7
S	165	DEECASTLE	25.0	27.5
S	166	DEECASTLE	19.9	20.9
S	167	DEECASTLE	25.0	27.5
S	168	DOUNE	25.0	27.5
S	169	DREGHORN	25.0	27.5
S	170	DREGHORN	6.5	1.4
S	171	DRONGAN	10.7	12.4
S	172	DULSIE	10.7	12.4
S	173	DULSIE	15.0	14.4
S	174	DULSIE	10.9	10.2
S	175	DULSIE	15.0	14.4
S	176	DUNNET	15.0	14.4
S	177	DUNNET	15.0	14.4
S	178	DUNNET	10.7	12.4
S	179	DURISDEER	10.7	12.4
S	180	DURISDEER	10.7	12.4
S	181	DURNHILL	12.8	13.4
S	182	DURNHILL	15.0	14.4
S	183	DURNHILL	10.9	10.2
S	184	DURNHILL	10.9	10.2
S	185	DURNHILL	12.1	11.4
S	186	DURNHILL	10.7	12.4
S	187	DURNHILL	12.5	11.9
S	188	DURNHILL	12.5	11.9
S	189	DURNHILL	6.8	5.9
S	190	DURNHILL	12.5	11.9
S	191	DURNHILL	12.5	11.9
S	192	DURNHILL	10.1	11.4
S	193	DURNHILL	8.8	9.2
S	194	DURNHILL	10.7	12.4
S	195	DURNHILL	10.7	12.4
S	196	ECKFORD	25.0	27.5
S	197	ECKFORD	19.5	21.0
S	198	ECKFORD	25.0	27.5
S	199	ECKFORD	6.5	1.4
S	200	ECKFORD	19.5	19.7
S	201	ELGIN	12.8	13.4
S	202	ELGIN	26.0	28.8
S	203	ELGIN	15.0	14.4
S	204	ETHIE	10.7	12.4
S	205	ETTRICK	10.7	12.4

SURVEY	SOIL ASSOCIATION	UNIT NAME	Q95(1)	MAM(7)
S	206	ETTRICK	10.7	12.4
S	207	ETTRICK	10.7	12.4
S	208	ETTRICK	10.7	12.4
S	209	ETTRICK	29.7	32.7
S	210	ETTRICK	10.7	12.4
S	211	ETTRICK	8.0	7.9
S	212	ETTRICK	10.9	10.2
S	213	ETTRICK	9.3	8.5
S	214	ETTRICK	11.5	11.1
S	215	ETTRICK	6.8	5.9
S	216	ETTRICK	12.5	11.9
S	217	ETTRICK	15.0	14.4
S	218	ETTRICK	12.5	11.9
S	219	ETTRICK	8.9	8.0
S	220	ETTRICK	8.9	8.0
S	221	ETTRICK	10.7	12.4
S	222	ETTRICK	10.7	12.4
S	223	ETTRICK	10.7	12.4
S	224	ETTRICK	10.7	12.4
S	225	ETTRICK	10.7	12.4
S	226	ETTRICK	13.7	13.8
S	227	ETTRICK	10.7	12.4
S	228	ETTRICK	15.0	14.4
S	229	ETTRICK	15.0	14.4
S	230	ETTRICK	15.0	14.4
S	231	ETTRICK	15.0	14.4
S	232	ETTRICK	10.7	12.4
S	233	ETTRICK	12.8	13.4
S	234	ETTRICK	12.1	11.4
S	235	ETTRICK	10.7	12.4
S	236	ETTRICK	10.7	12.4
S	237	FORFAR	10.7	12.4
S	238	FORFAR	10.7	12.4
S	239	FORFAR	10.7	12.4
S	240	FOUDLAND	10.7	12.4
S	241	FOUDLAND	10.7	12.4
S	242	FOUDLAND	10.7	12.4
S	243	FOUDLAND	10.7	12.4
S	244	FOUDLAND	15.0	14.4
S	245	FOUDLAND	10.9	10.2
S	246	FOUDLAND	12.5	11.9
S	247	FOUDLAND	12.5	11.9
S	248	FOUDLAND	8.8	9.2
S	249	FOUDLAND	10.9	10.2
S	250	FOUDLAND	10.7	12.4
S	251	FOUDLAND	10.7	12.4
S	252	FOUDLAND	12.9	13.4
S	253	FOUDLAND	15.0	14.4
S	254	FOUDLAND	15.0	14.4
S	255	FOUDLAND	10.7	12.4

SURVEY	SOIL ASSOCIATION	UNIT NAME	Q95(1)	MAM(7)
S	256	FOUDLAND	9.5	10.5
S	257	FOUDLAND	10.7	12.4
S	258	FOUDLAND	10.7	12.4
S	259	FRASERBURGH	25.0	27.5
S	260	FRASERBURGH	25.0	27.5
S	261	FRASERBURGH	19.5	19.7
S	262	FRASERBURGH	6.5	1.4
S	263	FRASERBURGH	6.8	5.9
S	264	GLENALMOND	10.7	12.4
S	265	GLENALMOND	10.7	12.4
S	266	GLENALMOND	10.7	12.4
S	267	GLENALMOND	10.7	12.4
S	268	GLENALMOND	15.0	14.4
S	269	GLENALMOND	10.8	10.8
S	270	GLENALMOND	6.8	5.9
S	271	GLENALMOND	10.7	12.4
S	272	GLENALMOND	15.0	14.4
S	273	GLENEAGLES	25.0	27.5
S	274	GOURDIE	10.7	12.4
S	275	GOURDIE	8.8	9.2
S	276	GOURDIE	10.7	12.4
S	277	GOURDIE	12.9	13.4
S	278	GRULINE	25.0	27.5
S	279	GRULINE	11.4	11.3
S	280	GRULINE	6.8	5.9
S	281	HATTON	8.8	9.2
S	282	HATTON	10.7	12.4
S	283	HATTON	15.0	14.4
S	284	HATTON	10.9	10.2
S	285	HATTON	12.9	13.4
S	286	HATTON	15.0	14.4
S	287	HAYFIELD	10.7	12.4
S	288	HAYFIELD	10.7	12.4
S	289	HAYFIELD	10.7	12.4
S	290	HAYFIELD	15.0	14.4
S	291	HINDSWARD	10.7	12.4
S	292	HINDSWARD	10.7	12.4
S	293	HINDSWARD	6.8	5.9
S	295	HOBKIRK	10.7	12.4
S	296	HOBKIRK	10.7	12.4
S	297	HOBKIRK	10.7	12.4
S	298	HOBKIRK	10.7	12.4
S	299	HOBKIRK	12.9	13.4
S	300	HOBKIRK	12.9	13.4
S	301	HOBKIRK	15.0	14.4
S	302	HOBKIRK	10.9	10.2
S	303	HOLYWOOD	10.7	12.4
S	304	HOLYWOOD	10.7	12.4
S	305	HOLYWOOD	10.7	12.4
S	306	HOLYWOOD	10.7	12.4

SURVEY	SOIL ASSOCIATION	UNIT NAME	Q95(1)	MAM(7)
S	307	INCHKENNETH	10.7	12.4
S	308	INCHKENNETH	10.7	12.4
S	309	INCHKENNETH	10.7	12.4
S	310	INCHKENNETH	6.8	5.9
S	311	INCHKENNETH	6.8	5.9
S	312	INCHKENNETH	6.8	5.9
S	313	INCHKENNETH	10.7	12.4
S	314	INCHNADAMPH	25.0	27.5
S	315	INCHNADAMPH	15.9	16.3
S	316	INSCH	10.7	12.4
S	317	INSCH	12.0	13.0
S	318	INSCH	10.7	12.4
S	319	INSCH	15.0	14.4
S	320	INSCH	10.9	10.2
S	321	INSCH	10.7	12.4
S	322	INSCH	12.5	11.9
S	323	INSCH	10.7	12.4
S	324	INSCH	10.7	12.4
S	325	INSCH	12.5	11.9
S	326	INSCH	10.7	12.4
S	327	INSCH	10.9	10.2
S	328	INSCH	12.0	13.0
S	329	INSCH	8.8	9.2
S	330	INSCH	10.7	12.4
S	331	KILMARNOCK	10.7	12.4
S	332	KILMARNOCK	10.7	12.4
S	333	KINTYRE	10.7	12.4
S	334	KINTYRE	6.8	5.9
S	335	KINTYRE	10.7	12.4
S	336	KINTYRE	6.8	5.9
S	337	KIPPEN	30.0	33.1
S	338	KIPPEN	10.7	12.4
S	339	KIPPEN	10.7	12.4
S	340	KIPPEN	10.7	12.4
S	341	KIPPEN	10.7	12.4
S	342	KIPPEN	15.0	14.4
S	343	KIPPEN	12.1	11.4
S	344	KIPPEN	10.9	10.2
S	345	KIPPEN	15.0	14.4
S	346	KIPPEN	12.5	11.9
S	347	KIPPEN	15.0	14.4
S	348	KIRKCOLM	25.0	27.5
S	349	KIRKWOOD	10.7	12.4
S	350	KIRKWOOD	8.8	9.2
S	351	KNOCKSKAE	10.7	12.4
S	352	KNOCKSKAE	10.7	12.4
S	353	KNOCKSKAE	10.7	12.4
S	354	KNOCKSKAE	15.0	14.4
S	355	KNOCKSKAE	12.1	11.4
S	356	KNOCKSKAE	10.7	12.4

SURVEY	SOIL ASSOCIATION	UNIT NAME	Q95(1)	MAM(7)
S	357	KNOCKSKAE	12.5	11.9
S	358	KNOCKSKAE	12.5	11.9
S	359	LANFINE	10.7	12.4
S	360	LANFINE	10.7	12.4
S	361	LANFINE	6.8	5.9
S	362	LAUDER	10.7	12.4
S	363	LAUDER	10.7	12.4
S	364	LAUDER	10.7	12.4
S	365	LAUDER	12.2	13.1
S	366	LAUDER	12.8	13.4
S	367	LAUDER	10.9	10.2
S	368	LAURENCEKIRK	10.7	12.4
S	369	LESLIE	10.7	12.4
S	370	LESLIE	10.7	12.4
S	371	LESLIE	10.7	12.4
S	372	LESLIE	10.7	12.4
S	373	LESLIE	10.7	12.4
S	374	LETHANS	10.7	12.4
S	375	LETHANS	10.7	12.4
S	376	LETHANS	12.9	13.4
S	377	LETHANS	15.0	14.4
S	378	LETHANS	15.0	14.4
S	379	LINFERN	10.9	10.2
S	380	LINKS	25.0	27.5
S	381	LINKS	15.8	14.6
S	382	LINKS	6.8	5.9
S	383	LINKS	25.0	27.5
S	384	LINKS	6.8	5.9
S	385	LOCHINVER	10.7	12.4
S	386	LOCHINVER	10.7	12.4
S	387	LOCHINVER	10.7	12.4
S	388	LOCHINVER	10.7	12.4
S	389	LOCHINVER	10.7	12.4
S	390	LOCHINVER	10.9	10.2
S	391	LOCHINVER	10.9	10.2
S	392	LOCHINVER	10.9	10.2
S	393	LOCHINVER	10.7	12.4
S	394	LOCHINVER	10.9	10.2
S	395	LOCHINVER	9.7	8.9
S	396	LOCHINVER	12.5	11.9
S	397	LOCHINVER	8.8	9.2
S	398	LOCHINVER	10.7	12.4
S	399	LYNEDARDY	8.7	9.1
S	400	LYNEDARDY	10.9	10.2
S	401	MAUCHLINE	10.7	12.4
S	402	MAUCHLINE	10.7	12.4
S	403	MAUCHLINE	6.8	5.9
S	404	MAUCHLINE	10.7	12.4
S	405	MILLBUIE	10.7	12.4
S	406	MILLBUIE	10.7	12.4

SURVEY	SOIL ASSOCIATION	UNIT NAME	Q95(1)	MAM(7)
S	407	MINTO	10.7	12.4
S	408	MINTO	10.7	12.4
S	409	MINTO	10.7	12.4
S	410	MINTO	12.8	13.4
S	411	MINTO	12.5	11.9
S	412	MINTO	15.0	14.4
S	413	MOUNTBOY	10.7	12.4
S	414	MOUNTBOY	10.7	12.4
S	415	MOUNTBOY	9.5	10.5
S	416	MOUNTBOY	10.7	12.4
S	417	MOUNTBOY	15.0	14.4
S	418	MOUNTBOY	12.8	13.4
S	420	NIGG	25.0	27.5
S	421	NIGG	6.5	1.4
S	422	NOCHTY	19.5	19.7
S	423	NORTH MORMOND	10.7	12.4
S	424	NORTH MORMOND	10.7	12.4
S	425	NORTH MORMOND	29.7	32.7
S	426	NORTH MORMOND	15.0	14.4
S	427	ORDLEY	8.8	9.2
S	428	ORDLEY	24.1	26.8
S	429	PETERHEAD	10.7	12.4
S	430	PETERHEAD	10.7	12.4
S	431	RACKWICK	10.9	10.2
S	432	REPPOCH	10.7	12.4
S	433	REPPOCH	10.7	12.4
S	434	REPPOCH	12.9	13.4
S	435	REPPOCH	12.5	11.9
S	436	REPPOCH	10.9	10.2
S	437	RHINS	10.7	12.4
S	438	RHINS	10.7	12.4
S	439	RHINS	10.7	12.4
S	440	RHINS	10.7	12.4
S	441	RHINS	10.7	12.4
S	442	RHINS	10.7	12.4
S	443	RHINS	10.7	12.4
S	444	ROWANHILL	10.7	12.4
S	445	ROWANHILL	10.7	12.4
S	446	ROWANHILL	10.7	12.4
S	447	ROWANHILL	10.7	12.4
S	448	ROWANHILL	28.6	31.4
S	449	ROWANHILL	15.0	14.4
S	450	ROWANHILL	10.9	10.2
S	451	ROWANHILL	12.9	13.4
S	452	ROY	17.9	20.0
S	453	ROY	9.3	8.5
S	454	SABHAIL	37.1	40.6
S	455	SABHAIL	15.0	14.4
S	456	SABHAIL	10.9	10.2
S	457	SABHAIL	31.8	33.7

SURVEY	SOIL ASSOCIATION	UNIT NAME	Q95(1)	MAM(7)
S	458	SHAWHILL	10.7	12.4
S	459	SKELBERRY	12.9	13.4
S	460	SKELBERRY	15.0	14.4
S	461	SKELBERRY	15.0	14.4
S	462	SKELMUIR	10.7	12.4
S	463	SKELMUIR	6.8	5.9
S	464	SMAILHOLM	10.7	12.4
S	465	SORN	10.7	12.4
S	466	SORN	10.7	12.4
S	467	SORN	10.7	12.4
S	468	SORN	10.8	11.3
S	469	SORN	10.9	10.2
S	470	SORN	8.7	9.1
S	471	SORN	10.7	12.4
S	472	SOURHOPE	10.7	12.4
S	473	SOURHOPE	10.7	12.4
S	474	SOURHOPE	10.7	12.4
S	475	SOURHOPE	10.7	12.4
S	476	SOURHOPE	15.0	14.4
S	477	SOURHOPE	10.9	10.2
S	478	SOURHOPE	10.9	10.2
S	479	SOURHOPE	10.7	12.4
S	480	SOURHOPE	12.1	11.4
S	482	SOURHOPE	10.7	12.4
S	483	STAFFIN	10.7	12.4
S	484	STAFFIN	10.7	12.4
S	485	STAFFIN	6.8	5.9
S	486	STAFFIN	6.8	5.9
S	487	STIRLING	10.7	12.4
S	488	STIRLING	10.7	12.4
S	489	STIRLING	6.8	5.9
S	490	STONEHAVEN	10.7	12.4
S	491	STONEHAVEN	10.7	12.4
S	492	STONEHAVEN	10.7	12.4
S	493	STONEHAVEN	30.0	33.1
S	494	STONEHAVEN	15.0	14.4
S	495	STONEHAVEN	10.7	12.4
S	496	STONEHAVEN	10.7	12.4
S	497	STRICHEN	10.7	12.4
S	498	STRICHEN	10.7	12.4
S	499	STRICHEN	15.0	14.4
S	500	STRICHEN	10.9	10.2
S	501	STRICHEN	10.9	10.2
S	502	STRICHEN	10.9	10.2
S	503	STRICHEN	11.3	12.7
S	504	STRICHEN	12.5	11.9
S	505	STRICHEN	10.7	12.4
S	506	STRICHEN	12.9	13.4
S	507	STRICHEN	[illegible].9	10.2
S	508	STRICHEN	[illegible].7	12.4

SURVEY	SOIL ASSOCIATION	UNIT NAME	Q95(1)	MAM(7)
S	509	STRICHEN	12.8	13.4
S	510	STRICHEN	12.5	11.9
S	511	STRICHEN	9.7	8.9
S	512	STRICHEN	10.7	12.4
S	513	STRICHEN	8.0	7.9
S	514	STRICHEN	10.7	12.4
S	515	STRICHEN	9.7	10.8
S	516	SYMINGTON	25.0	27.5
S	517	TARVES	29.7	32.7
S	518	TARVES	12.8	13.4
S	519	TARVES	10.7	12.4
S	520	TARVES	10.7	12.4
S	521	TARVES	15.0	14.4
S	522	TARVES	10.9	10.2
S	523	TARVES	10.9	10.2
S	524	TARVES	12.5	11.9
S	525	TARVES	10.7	12.4
S	526	TARVES	10.7	12.4
S	527	TARVES	12.8	13.4
S	528	TARVES	10.9	10.2
S	529	TARVES	10.7	12.4
S	530	TARVES	10.7	12.4
S	531	TARVES	10.9	10.2
S	532	TARVES	8.8	9.2
S	533	TARVES	8.8	9.2
S	534	TARVES	10.7	12.4
S	535	THURSO	15.0	16.9
S	536	THURSO	10.7	12.4
S	537	THURSO	10.7	12.4
S	538	THURSO	10.7	12.4
S	539	THURSO	10.7	12.4
S	540	THURSO	10.9	10.2
S	541	THURSO	15.0	14.4
S	542	THURSO	15.0	14.4
S	543	THURSO	15.0	14.4
S	544	THURSO	10.9	10.2
S	545	TIPPERTY	10.7	12.4
S	546	TOROSAY	10.7	12.4
S	547	TOROSAY	10.9	10.2
S	548	TOROSAY	10.9	10.2
S	549	TOROSAY	12.9	13.4
S	550	TOROSAY	9.7	8.9
S	551	TOROSAY	8.8	9.2
S	552	TORRIDON	10.7	12.4
S	553	TORRIDON	10.7	12.4
S	554	TORRIDON	12.1	11.4
S	555	TORRIDON	10.7	12.4
S	556	TORRIDON	10.9	10.2
S	557	TORRIDON	10.9	10.2
S	558	TORRIDON	9.7	8.9

SURVEY	SOIL ASSOCIATION	UNIT NAME	Q95(1)	MAM(7)
S	559	TORRIDON	15.0	14.4
S	560	TORRIDON	8.8	9.2
S	561	TORRIDON	10.7	12.4
S	562	TYNEHEAD	29.7	32.7
S	563	TYNEHEAD	10.7	12.4
S	564	TYNEHEAD	15.0	14.4
S	565	TYNET	10.7	12.4
S	566	TYNET	10.7	12.4
S	567	TYNET	15.0	14.4
S	568	WALLS	6.8	5.9
S	569	WALLS	12.9	13.4
S	570	WALLS	15.0	14.4
S	571	WALLS	10.9	10.2
S	572	WALLS	18.0	18.3
S	573	WALLS	10.7	12.4
S	574	WHITSOME	10.7	12.4
S	575	WHITSOME	10.7	12.4
S	576	YARROW	25.0	27.5
S	577	YARROW	25.0	27.5
S	578	YARROW	13.2	13.5
S	579	YARROW	19.5	19.7
S	580	YARROW	19.5	21.0
S	733	ORGANIC SOILS - 3DE	6.8	5.9
	HOST CLASS			
NI	1		40.8	50.8
NI	2		65.7	71.3
NI	3		25.0	27.5
NI	4		65.7	71.3
NI	5		49.0	53.4
NI	6		6.5	1.4
NI	7		6.5	1.4
NI	8		6.5	1.4
NI	9		6.5	1.4
NI	10		6.5	1.4
NI	11		6.8	5.9
NI	12		49.0	53.4
NI	13		10.7	12.4
NI	14		15.0	14.4
NI	15		10.7	12.4
NI	16		10.7	12.4
NI	17		10.7	12.4
NI	18		10.7	12.4
NI	19		1.1	0.1
NI	20		10.7	12.4

SURVEY	HOST CLASS	Q95(1)	MAM(7)
NI	21	10.7	12.4
NI	22	1.1	0.1
NI	23	10.7	12.4
NI	24	1.1	0.1
NI	25	6.8	5.9
NI	26	6.8	5.9
NI	27	6.8	5.9
NI	28	6.8	5.9
NI	29	31.9	40.3
NI	97	29.4	33.8
NI	98	65.1	49.6

Appendix 5 Annual minima of D-day durations

MEAN FLOW(M)	Mean flow calculated from those years of data used in the calculation of MAM(D), $m^3 s^{-1}$
MAM(D)	Mean annual D-day minimum flow, %MEAN FLOW(M)

STN NO	MEAN FLOW(M)	MAM(1)	MAM(7)	MAM(10)	MAM(30)	MAM(60)	MAM(90)	MAM(180)
2001	12.602	18.946	21.939	22.865	26.971	32.658	37.340	49.872
3001	16.425	12.412	14.408	15.091	18.723	24.609	32.236	51.111
3002	8.703	8.226	9.925	10.758	17.283	26.521	31.550	50.477
3003	16.554	4.746	5.783	6.461	15.074	25.524	31.906	49.937
3004	7.078	6.250	7.628	8.533	16.287	23.344	29.633	48.285
3803	2.058	7.715	9.477	10.181	15.870	23.733	31.201	43.323
4003	5.012	9.358	10.298	10.679	14.814	21.898	25.596	46.630
4005	6.967	4.816	6.022	6.648	17.718	27.217	35.473	55.727
5802	14.121	9.548	10.985	12.235	18.519	29.846	39.783	55.873
6001	72.302	15.003	15.639	16.006	19.956	29.181	37.336	55.971
6003	20.394	5.653	6.553	7.386	13.402	23.733	35.010	51.302
6006	0.860	5.607	6.929	7.512	10.996	16.441	24.305	49.084
6008	3.016	3.067	3.563	3.819	7.730	13.108	19.046	41.329
7001	13.336	13.551	14.887	15.445	21.500	30.888	39.548	62.598
7002	18.653	16.428	18.040	18.507	24.292	33.691	42.248	63.307
7003	2.592	26.540	28.438	28.969	33.046	39.541	46.254	63.049
7004	5.638	15.019	16.313	17.284	22.329	31.658	38.094	54.254
7005	2.828	19.575	20.518	20.988	24.374	36.186	45.580	65.737
7006	0.366	28.808	29.159	29.627	32.563	37.896	50.454	71.016
8001	55.910	28.493	30.195	30.907	37.689	45.330	52.769	70.931
8002	21.184	24.455	26.136	27.037	34.013	40.737	46.484	65.105
8004	14.519	26.574	29.469	30.402	37.182	47.279	55.551	72.896
8005	28.077	30.039	32.205	33.165	39.899	46.573	52.374	68.558
8006	64.089	28.726	30.693	31.474	38.301	45.904	52.821	70.095
8009	5.875	18.762	21.583	22.282	27.865	35.485	41.971	61.418
8010	36.456	26.942	28.711	29.648	36.483	43.161	50.035	68.185
8011	2.263	34.565	36.898	37.612	42.132	50.005	56.129	70.281
9001	8.940	27.268	29.044	29.705	33.775	39.820	45.372	60.273
9002	16.324	23.555	24.764	25.412	29.363	35.371	41.324	56.423
9003	2.634	23.610	24.965	25.521	29.573	37.450	44.384	56.223
9004	3.090	32.007	33.037	33.574	36.711	43.688	47.304	57.062
9005	1.560	26.825	30.843	31.391	35.516	42.226	48.331	63.982
10001	6.663	29.560	30.683	31.085	34.153	37.028	40.108	51.336
10002	4.672	27.932	29.045	29.588	33.028	37.060	41.659	51.824
10003	7.899	29.314	30.550	31.214	34.727	38.480	42.626	52.982
11001	20.154	29.944	31.279	31.843	35.525	40.705	44.605	56.142
11002	14.317	31.180	32.350	32.845	36.418	41.738	45.488	57.241
11003	10.509	31.966	33.546	34.095	37.883	43.338	46.849	58.129
12001	36.212	21.230	23.140	23.875	30.000	37.762	45.131	64.386
12002	45.850	16.798	18.893	19.623	25.559	34.370	40.146	57.260
12003	22.985	18.054	20.254	21.108	28.300	37.305	43.972	65.970
12004	0.502	7.519	9.107	9.673	15.872	22.002	29.116	45.189
12005	3.607	16.702	18.489	19.307	25.720	35.151	42.163	59.272
12006	3.962	19.709	22.767	23.418	28.992	37.888	45.844	60.772
12007	12.048	10.787	15.174	16.350	24.922	38.779	49.357	73.507
12008	5.079	18.954	19.771	20.217	25.085	31.365	40.134	56.652
13001	2.151	20.271	21.459	22.031	25.452	28.549	32.316	43.263
13002	2.363	20.746	21.818	22.547	25.842	29.251	33.044	44.968
13003	13.307	14.395	16.283	16.718	20.328	29.471	32.821	49.332
13004	3.043	23.840	25.141	25.616	30.655	38.328	47.535	64.375

STN NO	MEAN FLOW(M)	MAM(1)	MAM(7)	MAM(10)	MAM(30)	MAM(60)	MAM(90)	MAM(180)
13005	1.732	13.979	15.391	15.743	18.510	20.127	22.527	37.057
13007	19.677	16.686	17.569	18.034	21.339	26.742	33.773	49.567
13008	12.111	18.271	19.430	20.026	24.432	31.059	38.255	55.453
13009	3.594	21.340	22.710	23.106	27.176	34.053	40.764	58.774
14001	3.813	25.645	27.109	27.544	30.064	32.595	35.258	48.187
14002	1.545	15.730	17.413	17.920	20.890	24.182	26.955	39.629
15001	2.707	25.765	29.388	31.316	38.423	44.379	52.310	73.984
15002	0.492	24.287	25.914	26.683	32.795	36.906	42.004	57.774
15004	0.566	21.090	23.352	24.229	28.099	32.456	36.889	55.828
15005	1.019	18.975	21.616	22.620	27.202	30.783	35.365	54.682
15008	2.596	22.202	24.258	24.924	28.141	31.653	34.449	47.531
15010	7.595	18.500	20.212	20.582	23.791	28.456	32.670	49.567
15013	5.204	12.004	14.090	14.896	20.338	26.671	33.607	52.022
15021	1.460	9.201	10.189	10.710	13.207	17.794	25.064	45.773
15023	7.089	6.992	7.697	8.152	11.198	17.864	26.945	48.314
15024	16.090	3.734	4.419	4.911	10.155	16.304	23.298	50.254
15025	12.591	13.905	15.874	16.177	22.114	27.627	36.562	61.560
16001	20.857	11.098	12.728	13.381	20.064	26.698	34.086	49.639
16003	4.889	5.316	5.877	6.232	9.679	15.617	23.829	47.379
17004	2.028	18.112	20.121	20.699	24.226	28.310	32.728	46.715
17005	3.642	15.164	16.283	16.597	19.023	21.399	24.620	41.462
17008	0.840	12.028	12.487	12.587	13.608	18.470	27.155	48.090
17015	0.698	8.594	9.556	9.797	12.413	17.213	26.984	47.350
17017	0.148	5.743	6.805	6.993	55.774	60.655	63.419	72.783
18001	4.928	14.988	16.512	17.182	21.497	27.856	34.671	54.091
18002	4.105	22.151	24.358	25.207	29.756	34.915	40.869	57.664
18005	6.345	12.866	13.455	13.784	16.492	20.189	25.287	47.074
18008	12.340	4.294	5.063	5.459	9.118	15.931	23.083	48.205
18010	15.273	6.980	7.562	7.679	11.359	17.415	26.436	52.059
18012	1.660	7.591	8.142	8.525	10.828	18.535	23.093	47.620
18014	0.913	25.245	25.887	26.086	28.478	32.673	37.216	57.090
18016	0.118	1.694	1.724	1.863	7.481	19.825	31.691	62.019
18017	0.520	3.462	3.725	4.226	8.654	17.050	24.400	50.954
18018	0.404	10.902	12.063	12.731	17.638	23.750	32.590	52.992
18019	0.083	1.800	2.314	3.480	15.141	33.193	46.424	69.702
19002	0.945	13.185	15.797	16.689	20.691	27.569	32.378	50.205
19003	0.729	6.746	10.177	10.950	14.854	18.376	23.699	40.879
19004	1.483	21.542	24.256	24.944	29.836	35.758	40.847	57.836
19007	3.955	23.328	25.074	26.061	30.572	36.096	40.245	55.532
19008	1.338	27.419	29.624	30.214	33.270	37.641	41.249	53.587
19011	2.057	24.944	26.983	27.570	31.852	37.876	41.868	57.535
19014	0.862	9.399	10.692	10.594	15.096	21.491	38.604	49.260
19017	0.466	9.604	11.942	12.700	17.810	31.310	38.551	48.271
19811	0.624	7.449	8.948	9.363	13.370	21.517	27.792	47.075
20001	2.758	20.705	22.986	23.708	26.590	31.069	35.506	50.908
20003	1.336	21.961	23.873	24.418	27.013	30.679	34.769	49.633
20005	0.927	18.978	20.958	21.630	24.368	28.597	32.885	48.218
20006	0.566	29.237	34.721	35.540	39.293	43.601	46.888	57.208
20007	0.706	25.073	27.105	27.809	30.456	33.243	36.382	48.770
20008	0.134	8.197	11.231	12.072	20.268	28.167	30.671	57.847

STN NO	MEAN FLOW(M)	MAM(1)	MAM(7)	MAM(10)	MAM(30)	MAM(60)	MAM(90)	MAM(180)
20806	0.024	2.750	2.947	3.163	6.739	8.641	12.300	20.001
20807	0.062	20.677	21.554	21.646	22.896	26.918	33.065	45.675
20808	0.017	13.449	14.089	14.644	17.782	23.074	29.512	46.409
21001	0.689	13.329	14.711	15.292	17.671	20.978	27.677	48.650
21002	1.041	13.447	14.866	15.266	17.333	22.457	32.005	49.810
21003	14.846	20.644	22.362	23.015	26.220	31.205	35.151	52.862
21005	8.768	20.361	22.522	23.192	26.931	32.170	36.379	53.961
21006	35.146	16.381	18.144	18.771	23.069	30.073	35.035	54.733
21007	14.671	10.147	11.484	12.017	16.597	24.631	31.443	53.382
21008	19.362	14.201	15.344	15.949	19.543	27.503	33.755	51.841
21009	77.044	17.093	18.387	18.883	23.060	30.917	35.851	54.165
21010	42.022	16.690	18.189	18.888	23.771	30.625	35.146	55.623
21011	6.668	12.939	14.426	15.066	19.263	27.449	33.191	53.222
21012	8.293	11.035	12.064	12.625	16.497	24.880	31.782	51.240
21013	3.564	14.945	16.230	16.733	19.842	27.251	31.534	50.285
21014	3.887	20.305	22.821	23.363	26.960	32.457	36.840	53.522
21015	3.386	14.379	15.320	15.835	18.505	23.839	28.083	44.240
21016	1.272	13.215	14.456	14.868	17.423	21.619	26.795	39.794
21017	1.806	8.666	9.700	10.358	14.241	24.495	32.144	55.661
21018	2.858	22.892	24.515	24.799	27.642	31.900	34.776	49.822
21019	1.543	18.498	19.585	20.077	22.505	28.463	32.409	51.024
21020	5.091	13.216	14.613	15.385	19.359	27.058	32.495	52.252
21021	61.867	15.528	16.742	17.145	20.071	27.044	31.702	48.608
21022	6.339	19.485	21.165	21.673	24.434	29.200	33.475	45.863
21023	0.863	3.828	4.530	4.794	6.832	10.326	14.543	27.565
21024	2.299	18.336	19.518	19.939	22.983	29.695	35.108	50.250
21025	2.595	9.236	9.847	10.126	11.820	18.456	23.651	40.571
21026	1.339	4.477	5.106	5.408	8.123	16.591	23.600	48.299
21027	1.775	17.889	19.000	19.408	21.700	27.478	32.066	44.719
21028	0.206	12.821	14.348	14.968	19.948	26.035	36.095	53.433
21030	1.999	12.285	14.324	14.979	20.578	29.365	35.843	55.417
21031	8.438	19.867	21.892	22.388	26.389	33.021	38.320	55.764
21032	2.790	14.588	15.857	16.188	19.495	25.736	32.664	46.411
21034	3.786	10.354	11.173	11.661	14.566	22.436	28.966	50.287
21805	4.955	16.593	18.009	18.659	22.070	28.102	34.085	59.846
22001	8.574	15.171	16.942	17.407	20.646	27.990	32.716	45.968
22002	1.193	18.171	19.399	19.968	23.565	30.955	37.122	52.147
22003	0.567	15.840	16.492	16.934	20.679	28.118	34.898	52.224
22004	2.107	20.519	21.485	21.829	24.331	26.164	27.605	38.522
22006	2.111	6.178	6.949	7.211	9.472	12.817	17.039	28.410
22007	3.236	6.719	7.540	7.841	10.017	14.067	18.753	30.806
22008	0.516	12.428	13.907	14.231	16.881	22.518	26.900	43.572
22009	5.715	15.455	16.359	16.692	19.564	27.173	30.634	44.569
23001	43.411	11.449	12.448	13.048	19.340	27.546	35.614	54.356
23002	1.861	13.087	14.443	14.871	17.349	23.589	31.797	45.738
23003	19.792	9.038	9.695	10.179	17.491	27.008	34.863	53.898
23004	17.571	10.314	10.837	11.208	14.460	22.411	30.309	49.937
23005	7.791	9.119	10.063	11.145	21.770	35.895	45.069	65.455
23006	10.488	11.487	12.447	13.015	17.727	27.251	36.165	56.152
23007	3.968	25.690	29.132	30.164	34.830	43.048	54.323	62.421

STN NO	MEAN FLOW(M)	MAM(1)	MAM(7)	MAM(10)	MAM(30)	MAM(60)	MAM(90)	MAM(180)
23008	5.872	9.639	10.258	10.460	12.961	18.028	22.963	37.833
23010	1.761	6.664	7.109	7.279	9.834	14.957	21.817	42.837
23011	1.850	13.600	14.476	14.899	19.383	28.766	35.911	54.943
23014	0.800	11.845	12.834	13.468	18.070	24.912	35.498	54.563
24001	11.165	16.809	18.105	18.461	21.338	26.835	32.404	45.778
24002	0.910	20.378	22.733	23.421	26.560	31.677	35.382	47.723
24003	3.606	12.950	13.728	14.040	16.902	22.768	29.862	45.658
24004	1.220	13.965	14.866	15.331	18.499	23.969	30.751	46.627
24006	0.796	10.880	11.988	12.297	16.730	22.441	31.581	48.872
24007	0.540	12.321	12.874	13.191	15.253	18.612	23.561	34.975
24008	7.580	14.706	15.717	16.182	19.021	26.046	32.135	45.766
25002	7.667	7.760	9.561	10.549	19.639	29.560	44.268	65.390
25003	0.553	3.539	4.317	4.689	13.719	27.190	42.782	63.662
25006	2.234	4.675	5.123	5.444	8.259	14.849	25.018	46.207
25007	0.745	12.922	14.789	15.366	18.266	22.477	26.337	39.096
25011	0.416	4.813	5.178	5.311	7.023	13.776	22.145	46.047
25012	0.975	5.593	6.197	6.439	9.595	18.538	26.653	49.823
25013	0.261	6.122	7.543	7.767	11.695	16.382	19.436	21.547
25019	0.203	27.950	29.230	29.901	33.930	37.518	41.420	54.291
25027	0.062	8.006	9.607	9.607	11.102	14.972	18.023	28.733
26003	0.699	36.503	37.833	38.248	40.806	43.303	46.030	57.102
26004	0.310	0.081	0.236	0.286	0.981	1.922	4.244	21.652
26005	0.203	2.153	2.470	2.658	3.525	4.588	6.335	25.037
26007	0.099	1.378	1.614	1.718	2.339	3.827	6.379	16.878
27002	18.108	12.437	13.027	13.324	16.735	22.852	27.520	47.591
27007	20.517	11.283	12.368	13.022	18.024	24.458	33.666	50.987
27008	19.337	18.932	20.905	21.468	27.279	33.376	42.366	56.462
27009	48.947	14.084	15.167	15.564	18.832	23.863	29.438	46.044
27010	0.350	17.913	19.156	19.750	23.974	29.723	38.023	53.650
27015	16.381	32.108	33.780	34.673	38.377	42.696	46.557	57.486
27023	1.393	17.256	19.721	20.400	24.072	28.674	32.191	46.687
27024	10.457	11.664	12.736	13.454	19.484	26.554	38.842	57.354
27027	13.728	12.222	14.395	15.428	22.460	30.168	43.361	60.799
27032	0.173	13.041	13.982	14.281	16.700	22.160	29.924	51.583
27033	1.368	5.870	6.512	6.723	9.167	13.127	18.601	31.269
27034	15.184	5.778	6.511	6.909	11.079	17.871	25.595	47.394
27035	6.152	6.914	7.603	7.845	10.792	15.846	20.945	41.166
27038	0.592	71.003	72.434	72.762	74.304	76.083	77.552	84.437
27040	0.698	23.344	26.181	26.769	30.494	34.732	38.632	48.951
27041	17.178	29.445	30.281	30.695	33.696	38.238	41.434	50.850
27042	1.104	22.021	23.458	23.998	27.761	34.372	40.361	52.057
27043	14.362	9.472	10.069	10.382	13.910	19.996	25.472	46.106
27044	0.405	11.418	12.398	12.666	14.414	16.617	18.081	27.347
27047	0.540	3.620	4.161	4.544	7.243	12.541	22.192	46.328
27049	3.643	25.868	27.075	27.479	30.801	35.990	40.089	51.402
27050	5.143	13.047	14.132	14.679	17.398	21.849	27.142	43.890
27051	0.116	4.795	5.278	5.502	6.895	10.020	15.021	29.419
27052	0.867	19.419	20.717	21.169	23.792	27.556	30.372	42.901
27054	0.683	22.016	23.144	23.495	26.745	33.616	39.486	51.298
27055	2.197	26.349	28.116	28.727	31.990	38.040	43.326	54.727

STN NO	MEAN FLOW(M)	MAM(1)	MAM(7)	MAM(10)	MAM(30)	MAM(60)	MAM(90)	MAM(180)
27056	0.816	33.838	35.195	35.593	39.049	43.710	47.937	56.821
27057	1.798	12.144	13.315	13.645	15.962	22.077	28.241	41.778
27058	0.440	45.142	46.018	46.247	47.651	50.507	52.435	58.012
27059	1.041	11.531	12.298	12.662	14.868	19.294	25.435	37.864
27060	10.794	1.603	1.757	1.792	2.214	3.926	6.017	19.392
27064	0.626	32.313	34.648	35.298	39.333	42.395	45.583	54.876
27066	0.261	4.338	6.616	7.846	10.965	18.143	23.859	36.065
27067	0.598	15.993	17.720	18.405	22.860	28.938	34.128	44.833
27069	3.838	6.310	6.849	6.985	8.720	10.678	14.002	28.698
27070	1.414	7.074	7.506	7.690	9.070	11.569	13.470	28.528
27071	20.336	17.092	18.109	19.075	22.669	28.346	34.329	48.061
27072	1.377	23.391	24.629	25.001	28.365	34.485	37.677	49.022
27073	0.248	25.576	26.810	27.012	27.964	29.614	32.010	48.552
27075	2.045	18.336	19.129	19.354	21.189	24.288	30.439	40.564
27076	0.352	11.724	13.155	13.429	15.613	17.439	21.032	34.766
27077	0.697	24.714	26.891	27.752	34.184	42.324	46.710	58.766
27083	1.083	8.958	11.688	11.802	15.388	26.219	34.361	42.971
28003	5.862	43.044	48.021	49.742	55.994	62.075	66.944	77.657
28008	7.609	25.139	26.602	27.232	30.888	35.659	40.657	56.265
28009	85.278	32.851	35.448	36.168	40.063	44.440	47.956	58.234
28010	17.619	26.718	30.586	31.232	34.854	38.582	41.262	54.000
28011	12.877	26.714	28.727	29.339	31.997	36.212	39.614	53.357
28014	5.149	28.068	30.751	31.669	38.696	48.394	58.603	75.587
28018	14.038	27.578	29.376	30.341	34.333	40.520	46.221	59.547
28020	3.451	27.925	31.568	32.089	35.022	39.020	43.870	56.932
28022	90.636	30.429	32.615	33.645	37.826	42.468	45.695	55.858
28024	2.795	10.632	12.028	12.464	13.973	16.381	17.947	26.501
28025	1.492	15.570	17.188	17.602	20.198	24.468	28.733	40.608
28029	0.357	7.534	13.899	14.837	17.753	21.676	24.144	35.732
28030	0.080	15.102	16.218	16.872	19.278	24.423	28.332	44.513
28031	3.575	19.856	20.819	21.290	24.481	29.991	34.179	50.496
28033	0.253	14.467	15.742	16.381	20.007	27.179	35.469	53.760
28035	0.784	39.020	44.457	44.962	52.921	59.802	64.799	73.123
28038	1.186	5.371	6.384	6.914	10.104	15.715	20.614	39.499
28040	0.614	19.806	21.874	22.701	29.039	36.530	43.420	55.164
28041	0.717	6.845	8.228	8.638	11.476	16.705	21.822	41.917
28043	6.649	24.343	25.463	25.959	27.884	30.898	34.560	46.174
28044	0.332	61.347	66.500	67.255	70.211	72.310	74.110	79.461
28046	1.973	32.267	33.360	33.788	36.823	41.177	45.094	58.081
28053	2.348	26.359	28.508	28.969	32.184	36.699	40.910	50.320
28054	1.112	13.101	14.430	14.843	17.289	20.795	24.635	35.683
28055	0.699	16.379	17.689	18.202	21.697	24.613	27.390	42.418
28058	0.508	11.559	12.472	12.791	14.665	17.297	19.776	34.925
28060	0.160	41.683	45.479	46.302	49.100	51.406	53.499	59.940
28066	0.968	18.186	20.375	21.117	28.704	38.420	46.641	58.909
28070	0.188	10.128	11.433	11.833	13.602	18.491	24.008	40.905
28072	0.361	36.021	37.348	37.718	39.406	41.662	43.723	50.587
28075	0.638	7.602	9.719	10.346	17.830	26.188	31.278	53.633
28079	0.616	27.324	29.035	29.451	33.254	38.635	42.380	50.502
28082	1.477	19.365	21.172	21.702	24.613	28.223	32.045	42.853

STN NO	MEAN FLOW(M)	MAM(1)	MAM(7)	MAM(10)	MAM(30)	MAM(60)	MAM(90)	MAM(180)
28083	4.029	38.088	41.710	42.189	48.720	59.041	64.010	70.873
28085	17.925	27.416	31.233	31.924	35.500	39.059	42.011	54.140
28086	1.070	13.091	14.615	15.009	17.461	21.017	24.591	35.911
28091	1.717	34.592	36.997	39.346	48.563	51.669	55.744	64.205
28093	10.521	29.411	30.970	32.187	35.662	39.285	40.210	50.761
29002	0.730	46.822	48.109	48.478	50.502	53.180	55.453	66.214
29003	0.472	32.699	34.925	35.374	37.802	40.618	43.760	57.171
29004	0.307	2.689	3.335	3.626	5.540	7.784	9.563	24.252
29005	0.465	14.059	15.672	16.055	18.704	21.783	24.945	35.217
29009	0.148	3.851	4.966	5.246	6.659	8.503	9.836	18.669
30001	1.555	17.489	21.308	22.381	25.469	28.491	31.491	42.538
30003	1.324	11.504	13.383	13.842	16.837	19.869	22.410	33.519
30004	0.524	32.871	35.494	36.129	39.688	43.203	45.772	55.744
30011	0.376	26.209	28.351	29.105	32.236	34.722	37.172	47.536
30012	0.270	6.718	7.710	7.973	9.632	12.081	14.627	23.855
30013	0.137	20.652	22.838	23.646	26.871	30.137	32.042	41.580
30015	0.321	28.608	30.799	31.097	32.564	34.751	37.616	50.853
30017	0.223	13.108	13.684	13.937	14.848	18.422	23.844	31.789
30018	0.136	25.128	29.582	30.227	31.541	33.552	36.842	47.409
31006	1.002	25.625	29.050	29.766	33.201	36.994	39.533	51.201
31010	0.533	14.940	15.717	16.117	18.292	22.088	24.357	35.947
31011	0.092	1.518	2.040	2.230	4.300	7.036	9.007	19.409
31012	0.050	34.356	38.320	39.113	41.448	46.535	49.537	67.447
31016	0.234	34.599	36.721	37.241	39.480	41.516	44.243	56.340
31017	0.167	6.598	7.219	7.452	9.601	11.885	13.247	23.909
31019	0.073	22.036	23.806	23.964	26.672	29.840	33.589	61.998
31020	0.108	7.093	8.150	8.666	12.603	14.345	15.402	32.452
31022	0.078	1.805	2.062	2.217	4.056	6.432	6.949	14.601
31023	0.024	0.000	0.000	0.000	0.027	1.396	3.212	17.813
31024	0.122	33.862	36.623	37.190	39.821	42.244	46.178	63.226
31025	0.215	4.540	5.211	5.422	6.378	8.609	11.343	22.475
31026	0.020	1.692	2.257	2.651	4.927	7.550	10.167	22.029
32003	0.413	16.381	20.237	20.836	22.850	25.274	27.534	35.036
32004	1.374	18.158	20.669	21.263	24.306	27.429	30.036	40.105
32006	1.389	19.995	23.263	23.776	26.261	29.160	31.972	42.299
32015	0.037	16.430	17.916	18.566	30.231	41.152	45.589	56.081
32016	0.037	7.050	8.359	8.837	15.925	21.649	30.317	45.139
32020	0.226	41.291	43.942	44.772	48.903	52.356	54.341	62.116
32024	0.035	21.166	22.375	23.283	25.540	26.363	26.889	31.513
32027	0.052	1.934	1.934	1.934	1.934	1.934	1.934	9.407
32029	0.035	2.843	2.843	3.270	4.644	6.136	7.250	16.711
32030	0.085	30.525	32.705	34.634	42.422	50.620	54.919	72.210
32031	0.479	12.166	14.374	14.996	16.512	19.148	21.604	30.958
33002	10.250	10.603	13.062	13.633	16.524	19.558	22.265	33.390
33003	3.520	25.618	31.520	32.731	36.993	40.367	42.772	52.607
33006	1.892	30.511	32.350	33.256	36.581	39.848	43.193	54.878
33007	1.226	45.426	48.326	49.214	52.114	54.525	57.436	67.292
33009	9.545	13.083	16.263	16.754	19.482	22.246	24.509	36.931
33011	0.443	29.094	30.567	31.094	33.670	36.554	39.144	50.518
33013	0.699	22.831	26.004	26.444	29.526	32.336	35.229	45.075

STN NO	MEAN FLOW(M)	MAM(1)	MAM(7)	MAM(10)	MAM(30)	MAM(60)	MAM(90)	MAM(180)
33014	1.313	43.122	48.678	49.137	52.519	54.963	57.536	65.451
33015	1.908	22.916	25.352	26.083	29.063	32.034	35.001	45.535
33018	1.079	19.641	21.171	21.619	23.660	27.144	29.245	41.356
33019	1.868	25.033	27.319	27.954	31.557	34.455	37.946	50.300
33020	0.862	1.445	1.983	2.131	3.384	4.790	6.606	14.151
33021	1.255	27.244	30.493	31.270	33.599	36.208	38.380	49.362
33022	2.993	38.506	41.769	42.557	45.843	49.742	52.823	61.479
33024	1.013	39.542	43.313	44.201	47.886	51.098	53.267	62.021
33027	0.536	19.371	20.618	21.030	23.079	25.822	27.789	39.305
33029	0.530	22.193	23.139	23.541	25.492	27.918	30.415	44.360
33031	0.312	13.565	14.891	15.272	16.872	19.041	20.832	32.481
33032	0.214	42.398	43.889	44.296	46.263	48.248	50.625	62.950
33034	3.920	33.962	35.967	36.494	39.198	41.832	44.503	55.431
33037	5.235	12.294	13.442	13.763	15.675	18.428	20.347	31.482
33040	0.063	44.826	46.070	46.639	49.482	52.845	55.521	73.557
33044	1.549	23.161	24.500	25.126	28.730	31.487	35.374	47.698
33045	0.139	13.748	15.150	15.602	18.330	21.246	24.371	36.636
33046	0.904	14.365	15.654	16.092	18.971	22.133	25.643	37.226
33048	0.054	27.987	29.486	30.147	33.234	36.916	40.856	54.272
33049	0.266	40.471	42.127	42.618	45.475	48.010	50.122	61.545
33050	0.332	52.374	55.855	56.609	60.267	62.681	65.501	73.823
33051	0.626	34.091	39.336	40.088	42.674	44.835	46.584	55.495
33052	0.163	49.986	51.390	51.835	54.210	56.590	58.787	69.590
33054	0.532	52.092	54.342	54.751	56.641	58.689	60.225	70.352
33055	0.267	14.695	16.653	17.289	20.032	24.133	28.440	40.149
33058	1.932	28.681	30.273	30.495	32.769	35.728	38.370	47.434
33063	0.511	31.491	33.574	34.114	36.798	40.032	42.542	53.243
33066	0.218	14.481	14.949	15.107	16.523	19.477	25.380	36.264
33809	0.149	0.896	2.657	2.868	5.684	7.661	8.851	15.738
34001	1.454	22.687	25.522	26.153	30.135	33.389	36.377	46.299
34002	0.746	22.136	26.077	26.943	30.920	34.069	36.939	47.469
34003	1.121	54.144	56.349	56.931	60.466	64.334	67.034	73.625
34004	4.142	29.925	36.839	38.001	43.281	47.404	50.630	59.645
34005	0.351	25.883	29.130	29.870	33.700	37.136	40.974	51.162
34006	1.878	15.586	17.613	17.925	19.707	21.849	23.445	32.711
34007	0.703	19.665	21.021	21.269	22.607	24.578	25.740	34.035
34008	0.314	50.749	53.750	54.739	59.480	65.665	68.905	78.640
34010	0.781	8.807	9.935	10.161	11.905	14.259	16.368	26.973
34011	0.896	39.522	41.594	42.093	44.894	47.678	50.667	60.771
34012	0.355	47.449	51.806	52.227	54.918	56.960	59.321	71.005
34014	2.681	36.640	39.678	40.500	43.784	47.291	50.802	60.367
34018	0.537	37.212	39.211	40.014	44.477	48.813	51.854	61.663
34019	2.244	42.223	51.959	52.665	56.399	61.267	65.111	72.979
35003	0.280	16.941	17.490	17.765	19.389	20.907	22.079	29.462
35004	0.315	21.889	24.758	25.355	28.190	30.528	31.800	39.119
35008	0.638	12.046	13.474	13.809	15.676	18.170	19.133	27.961
35013	0.427	14.766	15.786	16.080	17.524	19.650	20.825	27.772
36002	0.475	16.276	17.116	17.411	19.101	21.940	24.648	31.845
36003	0.213	29.054	31.255	31.980	35.672	38.426	40.887	49.110
36005	0.705	16.390	18.376	18.749	21.326	23.862	25.818	34.164

STN NO	MEAN FLOW(M)	MAM(1)	MAM(7)	MAM(10)	MAM(30)	MAM(60)	MAM(90)	MAM(180)
36007	0.184	12.883	14.021	14.449	16.120	18.108	21.045	28.503
36009	0.125	2.408	2.860	3.029	4.489	5.842	7.791	18.666
36010	0.141	1.481	1.823	1.953	2.769	4.148	6.710	15.109
37001	2.010	12.817	15.577	16.161	19.364	23.320	26.307	36.174
37005	1.045	18.328	20.760	21.405	24.460	27.633	30.644	39.450
37008	1.043	25.209	27.841	28.540	31.385	34.092	36.225	44.346
37009	0.377	41.080	44.805	45.592	49.378	52.229	54.737	61.788
37011	0.363	15.218	16.586	17.120	19.106	21.321	23.195	31.535
37012	0.277	1.702	2.147	2.365	3.575	5.221	8.124	17.049
37013	0.298	9.738	11.995	12.426	15.117	17.822	20.016	28.755
37016	0.336	4.628	5.589	6.099	7.850	9.440	10.767	19.370
37019	0.344	18.379	20.042	20.769	27.829	37.471	43.479	55.046
37020	0.683	22.553	24.831	25.350	27.534	29.926	32.327	40.295
37021	0.232	25.992	31.807	32.650	36.557	39.552	42.295	49.679
37031	0.340	10.147	12.635	13.306	18.986	25.092	32.534	47.352
37033	0.052	14.156	16.952	17.459	27.338	39.018	49.018	62.461
38002	0.327	22.838	23.928	24.202	25.991	28.334	30.876	40.799
38003	0.537	62.086	64.220	65.005	68.600	71.456	73.594	81.215
38007	0.192	21.330	23.891	24.881	31.284	39.755	45.395	57.778
38014	0.157	8.900	10.931	11.724	17.232	26.317	31.197	43.862
38018	1.284	45.571	49.357	50.293	55.406	60.466	63.588	72.920
38022	0.428	28.273	30.721	31.482	37.849	47.815	56.062	68.456
38024	0.345	17.939	24.044	26.285	35.231	43.338	47.752	57.475
38026	0.306	8.284	9.122	9.370	11.429	13.944	16.472	25.955
38029	0.174	23.149	23.588	23.748	25.121	27.691	28.905	38.556
38030	0.619	49.933	52.093	52.844	56.370	61.329	64.677	72.848
39002	28.160	11.249	14.151	14.724	17.563	20.658	23.463	35.258
39003	1.809	58.045	64.299	65.717	70.665	74.976	79.126	87.713
39005	0.524	43.778	51.070	52.476	58.489	66.017	72.137	80.291
39006	3.286	27.580	29.511	30.105	32.825	35.958	38.598	50.812
39011	2.938	46.381	47.865	48.329	50.429	53.742	55.887	64.647
39015	0.391	54.265	57.958	58.403	60.530	62.770	64.980	74.273
39016	9.624	42.863	44.613	45.228	47.970	51.245	53.721	64.600
39017	0.100	0.000	0.000	0.025	0.781	2.070	4.502	17.639
39019	1.716	53.467	55.709	56.051	58.687	60.956	63.293	73.610
39020	1.328	36.350	37.319	37.581	39.221	41.672	44.141	55.445
39021	3.842	17.513	19.744	20.344	23.160	27.557	29.688	42.975
39022	2.150	44.033	46.147	46.612	48.674	50.872	52.716	61.902
39023	1.008	60.497	65.050	65.885	69.419	74.014	78.214	87.528
39028	0.744	43.097	44.949	45.401	47.268	49.611	51.881	62.116
39029	0.559	70.057	71.914	72.407	75.037	77.551	79.507	84.772
39031	1.018	50.486	51.570	51.917	54.402	58.426	61.101	72.836
39033	0.166	42.378	44.119	44.575	47.783	51.940	57.299	71.653
39034	3.687	20.222	21.118	21.495	23.334	26.220	28.701	41.939
39036	0.114	78.888	82.018	82.670	85.852	88.101	89.457	92.438
39042	0.761	14.400	15.418	15.721	17.080	18.887	20.895	34.153
39043	2.568	32.179	34.259	34.764	37.288	39.843	42.276	55.992
39046	28.656	7.561	10.486	10.840	14.366	16.119	19.004	28.800
39049	0.262	13.150	14.280	14.973	20.139	33.379	37.699	57.177
39051	0.832	25.390	27.549	28.178	31.166	35.722	38.301	50.013

STN NO	MEAN FLOW(M)	MAM(1)	MAM(7)	MAM(10)	MAM(30)	MAM(60)	MAM(90)	MAM(180)
39054	0.349	6.361	7.183	7.519	10.415	13.876	17.188	31.462
39056	0.403	31.917	35.124	37.646	45.211	53.540	60.469	71.774
39057	0.534	15.481	18.741	20.432	28.625	38.310	45.115	63.718
39058	0.188	40.485	43.444	45.409	52.020	60.589	66.232	77.268
39061	0.088	16.964	18.065	18.424	20.665	24.071	28.249	43.254
39065	0.049	45.161	46.305	46.763	49.883	55.429	60.972	81.052
39068	3.938	20.126	21.928	22.472	25.358	28.613	31.773	43.218
39072	57.030	29.283	30.661	31.282	33.967	37.081	38.544	50.657
39076	2.643	27.035	28.708	29.146	30.715	33.413	36.047	49.835
39078	0.674	22.709	25.606	26.079	28.484	32.666	35.831	49.904
39079	6.504	30.646	35.295	36.391	40.879	45.585	47.169	55.343
39081	1.543	22.875	25.673	26.077	28.084	30.975	33.014	43.287
39088	0.613	55.391	58.518	59.498	63.557	66.735	69.890	81.790
39089	0.158	42.727	45.671	46.737	51.329	55.204	59.244	75.026
39093	1.006	9.641	15.185	17.905	29.580	44.277	52.955	66.886
39095	0.154	22.441	24.978	26.298	35.567	47.142	55.291	68.235
39096	0.161	10.774	13.818	15.056	24.076	38.482	47.829	63.660
39097	9.655	15.261	16.571	16.922	19.336	22.176	24.672	39.153
39098	0.178	4.483	6.083	6.780	10.609	18.182	28.371	37.717
39101	0.209	19.954	20.618	20.911	22.334	23.798	25.301	36.665
39102	0.291	43.230	45.563	46.849	52.604	56.366	61.827	70.127
40006	0.394	38.002	42.066	42.663	45.619	48.876	51.184	60.452
40007	2.969	14.162	17.630	18.032	20.452	23.567	25.559	35.806
40008	2.251	19.991	23.308	24.244	26.947	30.402	33.652	44.815
40011	3.293	36.233	38.748	39.391	42.424	45.652	48.116	56.904
40017	0.290	14.213	16.086	16.379	17.985	20.351	21.700	28.309
40020	0.781	14.377	15.603	16.247	20.619	23.740	27.651	35.833
40021	0.310	13.615	14.639	15.095	16.817	20.802	24.616	41.439
40024	0.335	14.488	14.702	14.862	15.395	16.189	18.196	29.268
41001	0.182	6.756	7.795	8.183	9.958	12.020	14.778	24.142
41002	0.239	16.163	18.259	19.115	22.139	24.898	27.988	36.416
41003	1.712	4.123	5.174	5.433	7.240	9.442	12.893	27.305
41005	2.120	11.263	13.021	13.411	16.750	19.635	22.981	36.884
41006	1.146	14.208	16.154	16.526	19.089	21.846	24.522	36.502
41009	4.941	34.235	36.896	37.590	40.420	44.331	46.288	56.049
41010	0.942	2.871	4.253	4.561	6.682	8.754	11.375	23.069
41011	2.176	29.986	31.507	31.841	33.918	36.854	39.388	49.923
41012	1.157	10.872	12.492	12.911	15.182	17.810	20.555	29.123
41013	0.153	9.504	10.763	11.192	13.400	15.587	18.360	27.455
41014	3.722	7.771	9.351	9.603	11.257	13.629	16.867	28.485
41016	0.199	6.697	7.739	8.194	10.191	12.856	15.659	25.389
41017	0.307	6.934	7.549	7.862	9.982	12.107	15.226	24.721
41020	0.461	5.863	6.862	7.185	8.715	10.705	12.458	21.881
41022	0.577	6.383	7.866	8.365	10.069	12.591	15.478	27.191
41024	0.258	16.606	18.111	18.958	21.331	23.748	26.807	37.382
41025	1.077	3.506	4.012	4.117	5.127	6.781	8.747	19.625
41026	0.399	11.726	13.166	13.681	16.319	19.159	22.579	34.362
41027	0.509	29.393	31.346	31.757	33.731	36.930	39.228	50.572
41028	0.266	4.609	6.647	7.076	9.048	11.385	13.625	26.831
41029	0.508	1.871	2.264	2.575	4.416	6.310	11.001	14.888

STN NO	MEAN FLOW(M)	MAM(1)	MAM(7)	MAM(10)	MAM(30)	MAM(60)	MAM(90)	MAM(180)
41806	0.015	0.000	0.000	0.000	0.000	0.109	0.603	6.409
41807	0.097	13.073	13.761	14.071	15.688	17.930	21.682	31.148
42001	0.627	6.194	7.443	7.864	10.787	14.304	17.788	29.564
42003	0.970	5.392	6.305	6.892	10.180	14.869	19.290	36.685
42006	0.974	25.217	26.674	27.055	29.126	31.556	34.117	47.231
42007	1.563	70.304	71.972	72.330	73.729	75.357	77.145	84.096
42009	0.543	57.330	59.935	60.476	62.368	64.553	67.236	75.096
42010	5.304	59.447	61.366	61.842	63.931	66.242	68.296	75.651
42011	0.423	26.212	31.203	32.211	35.166	38.276	41.494	53.819
42012	1.844	60.438	62.281	62.777	64.974	67.201	69.064	76.230
42014	0.892	17.992	19.460	20.042	21.785	25.128	28.026	40.341
42015	0.092	23.798	26.580	28.233	35.463	36.508	38.521	47.788
42016	4.306	64.427	65.588	66.392	69.073	71.037	72.890	80.212
42018	0.176	12.230	14.506	15.245	19.834	25.935	28.604	37.564
42019	0.167	19.211	26.053	27.930	39.684	51.826	61.212	75.442
42020	0.361	56.950	59.642	60.580	62.867	65.679	68.035	77.721
43003	15.479	39.636	40.534	40.910	43.109	46.256	48.405	58.554
43004	0.778	31.156	33.294	33.905	36.257	38.932	41.066	52.318
43005	3.534	36.549	37.540	37.879	39.844	42.578	44.703	55.526
43006	2.889	33.889	35.765	36.117	38.014	41.095	43.716	54.059
43007	13.106	21.741	22.866	23.141	24.975	27.438	29.516	40.084
43008	4.038	32.040	33.559	33.928	35.938	38.424	40.777	50.938
43011	0.847	45.056	46.372	46.987	49.560	51.087	52.306	59.551
43012	1.084	40.877	42.720	43.326	45.948	48.124	49.549	57.372
43014	0.794	60.791	62.246	62.615	64.572	67.063	68.840	75.203
43017	0.660	19.052	19.991	20.421	22.801	26.369	28.504	40.275
43019	0.551	34.825	36.455	36.859	39.513	42.693	46.642	57.115
43021	18.574	35.417	37.584	38.055	40.100	42.182	44.590	55.620
44001	6.694	38.034	39.101	39.661	42.287	45.582	48.098	59.067
44002	2.351	35.609	36.897	37.213	39.084	41.588	43.698	53.605
44003	0.581	34.890	36.863	37.391	40.271	42.868	47.016	56.174
44004	3.043	29.637	31.978	32.745	34.965	39.258	42.512	52.887
44006	0.182	35.963	37.160	37.570	39.077	41.403	44.025	55.068
44009	0.314	32.976	34.610	34.922	36.494	38.642	40.617	51.711
45001	15.384	11.377	12.484	12.882	15.518	21.108	27.156	42.286
45002	11.960	11.851	12.635	13.078	15.837	22.645	29.127	44.106
45003	3.753	24.614	26.874	27.500	31.187	35.680	38.852	50.146
45004	4.984	23.439	24.663	25.052	27.855	31.724	35.301	47.725
45005	3.111	29.495	31.582	32.136	35.453	39.608	42.767	52.632
45008	2.045	23.566	24.715	25.120	27.596	31.400	33.719	43.464
45010	1.106	9.220	10.199	10.568	13.305	17.571	22.649	34.622
45011	4.474	10.173	10.862	11.597	13.769	19.148	32.048	47.299
45012	3.917	8.064	8.648	8.953	10.503	13.031	15.844	26.961
45829	0.418	27.240	30.714	31.253	32.975	35.817	37.690	47.226
46002	9.279	13.498	14.307	14.601	17.156	20.474	23.443	35.321
46003	11.005	14.009	15.077	15.648	19.421	24.684	30.368	46.058
46005	1.210	14.629	15.746	16.309	19.916	27.442	34.788	50.511
46006	1.826	12.577	13.413	13.901	16.299	22.261	27.791	44.142
46008	3.297	12.540	13.096	13.471	15.850	19.427	23.999	37.470
46812	0.833	7.997	8.598	8.807	9.710	11.630	13.844	25.010

STN NO	MEAN FLOW(M)	MAM(1)	MAM(7)	MAM(10)	MAM(30)	MAM(60)	MAM(90)	MAM(180)
46818	0.089	2.132	2.581	2.738	3.557	5.454	7.442	20.479
47001	22.550	9.052	9.671	10.004	12.189	15.720	19.693	35.703
47004	4.329	14.821	15.605	16.077	18.640	21.989	24.790	38.474
47005	3.063	6.741	7.287	7.580	9.745	14.842	19.085	31.672
47006	5.209	12.895	13.519	13.957	16.786	21.690	25.980	40.227
47007	1.632	13.392	14.223	14.816	17.806	22.686	28.049	43.209
47008	2.404	3.457	4.032	4.332	6.072	9.578	13.677	28.727
47009	0.884	14.570	15.393	15.775	17.866	21.429	23.668	36.927
47014	1.794	18.040	19.139	19.654	22.418	29.481	34.781	50.992
47016	0.507	16.045	16.972	17.379	18.841	21.542	24.188	37.157
47017	0.770	2.887	3.433	3.762	5.642	10.373	15.048	31.099
48003	2.030	20.180	22.868	23.684	26.998	32.361	35.642	46.366
48004	0.805	23.615	25.067	25.872	29.279	33.784	37.367	49.701
48005	0.378	13.558	14.420	14.804	16.779	19.238	21.293	32.143
48006	1.034	19.156	20.498	21.026	23.957	26.806	29.637	40.337
48009	0.813	16.857	17.629	18.071	20.697	24.532	28.057	41.134
48010	1.005	21.705	22.644	23.119	25.346	28.606	31.086	43.297
49001	5.906	15.748	16.883	17.464	20.816	25.052	29.182	43.136
49002	0.979	23.744	24.830	25.092	26.544	28.787	30.675	41.744
49004	0.689	15.178	16.053	16.419	18.617	21.967	24.842	36.205
50002	15.635	5.325	5.977	6.315	8.654	12.281	17.286	32.523
50007	1.876	7.390	8.099	8.408	10.357	13.305	16.342	27.372
50807	3.890	7.814	8.420	8.842	10.015	10.628	13.844	23.229
50809	1.600	6.675	7.265	7.690	9.433	14.059	20.722	33.904
51001	0.996	19.851	20.765	21.145	22.829	24.946	27.135	38.730
51003	0.757	20.370	21.781	22.179	24.589	28.458	31.942	45.727
52003	1.077	28.130	29.553	30.020	32.649	35.165	37.683	48.354
52004	1.308	18.854	20.638	21.093	23.486	27.253	30.055	41.460
52007	1.117	17.872	18.619	18.919	20.609	23.386	26.606	36.276
52009	1.063	24.769	26.343	26.981	30.260	34.112	39.807	54.537
52010	1.882	13.467	14.666	14.997	17.190	20.169	24.517	39.192
52011	0.783	5.200	5.659	5.869	7.330	9.407	11.733	24.761
52015	0.250	21.246	27.602	28.928	33.153	36.483	38.541	50.396
52016	0.207	28.387	30.184	30.884	33.560	36.132	38.823	49.575
52020	0.233	5.389	5.503	5.646	8.347	10.780	14.680	28.253
53002	1.440	23.253	29.250	29.844	32.612	35.769	38.311	46.005
53005	2.216	18.629	19.925	20.255	23.081	26.813	30.346	44.477
53006	1.709	11.197	12.547	13.029	16.185	20.296	24.101	37.538
53007	3.788	16.737	17.988	18.419	21.108	24.415	28.653	42.881
53008	3.077	11.063	13.638	13.923	16.119	18.669	21.106	37.935
53009	1.279	17.930	19.143	19.683	22.742	26.062	29.729	44.065
53013	1.201	20.385	23.233	23.758	26.138	29.233	31.842	43.704
53017	0.577	9.312	10.607	10.937	13.628	16.552	19.254	31.125
53018	15.900	18.801	21.585	22.226	24.779	27.935	30.667	43.532
53019	0.552	6.624	7.576	7.865	9.346	11.832	13.511	26.339
53025	1.638	11.951	13.363	13.706	16.586	20.202	24.851	40.344
53026	1.035	9.888	11.042	11.470	14.137	17.809	20.605	32.590
53029	0.870	21.054	21.952	22.294	24.709	27.613	29.147	39.296
54008	14.421	13.377	14.119	14.425	16.296	19.459	22.493	37.115
54010	2.203	11.853	13.518	14.057	16.243	19.713	22.075	36.459

STN NO	MEAN FLOW(M)	MAM(1)	MAM(7)	MAM(10)	MAM(30)	MAM(60)	MAM(90)	MAM(180)
54012	7.174	34.458	36.714	37.637	41.904	44.771	48.235	56.770
54014	13.640	7.798	8.826	9.371	16.158	21.452	26.768	44.180
54016	2.013	23.296	24.810	25.389	28.610	32.458	35.471	47.583
54017	2.067	15.390	16.080	16.375	18.673	21.500	24.951	37.561
54018	1.735	13.744	15.000	15.497	17.631	21.045	24.161	36.938
54019	2.562	17.152	18.723	19.186	22.734	26.829	29.718	41.891
54020	1.644	27.606	29.873	30.377	32.778	37.069	39.246	50.202
54022	0.529	8.283	9.153	9.654	12.956	21.605	29.740	52.537
54025	1.388	3.769	4.459	4.816	6.847	11.497	15.721	32.530
54027	2.431	32.178	34.507	35.047	37.958	40.668	43.073	54.856
54029	17.460	12.532	13.364	13.692	15.892	19.357	22.081	33.642
54034	0.388	8.138	8.956	9.241	10.974	13.402	16.016	25.023
54036	0.664	14.108	15.268	15.757	18.102	21.138	22.972	35.472
54038	6.428	8.351	9.413	9.857	12.442	17.119	21.796	36.752
54040	1.245	41.594	43.749	44.422	48.003	51.669	54.007	62.346
54041	1.756	38.501	45.260	45.989	49.880	52.735	55.926	64.128
54048	0.741	10.415	11.030	11.305	13.159	17.328	19.212	34.022
54052	0.321	28.232	35.590	36.104	38.515	41.759	44.376	54.713
54053	1.036	11.868	13.040	13.431	14.848	16.768	19.837	28.162
54054	2.186	12.839	13.438	13.968	17.073	20.554	25.851	33.025
54065	1.238	21.203	23.205	23.831	25.587	26.964	29.371	39.802
54084	0.353	14.098	15.586	16.227	17.822	20.265	22.832	35.289
54085	0.142	12.353	13.009	13.324	14.841	18.065	22.039	37.695
54087	0.023	10.315	15.157	15.473	19.009	21.441	25.215	41.235
54088	1.114	21.189	23.219	23.882	27.432	32.992	35.608	50.941
54090	0.058	6.963	8.055	8.595	13.107	23.414	31.583	51.461
54091	0.221	10.709	11.921	12.614	16.618	26.990	35.137	54.233
54092	0.193	9.551	10.450	11.104	15.083	24.332	32.092	50.768
54094	0.695	32.280	34.920	35.932	39.596	42.766	45.125	55.453
55002	45.365	12.126	13.343	13.922	17.296	21.685	27.788	42.570
55003	10.600	17.499	18.431	18.880	20.927	24.219	27.177	40.032
55004	3.184	7.298	8.535	9.079	14.480	22.638	32.293	51.216
55005	6.189	7.474	8.749	9.401	14.666	23.291	31.866	49.996
55007	35.971	11.052	11.860	12.224	15.186	19.669	25.974	40.952
55008	0.691	7.755	9.081	9.788	15.976	26.093	37.075	57.822
55009	6.201	13.314	14.526	15.019	17.335	22.436	27.757	44.915
55010	1.662	7.556	9.217	9.850	15.062	24.054	35.397	57.360
55011	2.589	4.126	5.002	5.423	8.024	12.798	19.159	39.485
55012	10.136	6.823	7.633	8.000	11.343	18.440	26.347	43.450
55013	2.412	12.643	14.026	14.341	15.997	19.614	23.381	37.691
55014	3.901	19.627	20.440	20.694	22.252	25.080	27.805	41.084
55016	9.018	3.464	4.036	4.303	6.162	11.517	14.561	29.553
55017	0.894	2.329	2.707	2.860	3.941	6.777	12.414	25.682
55018	1.215	13.061	13.965	14.308	16.149	18.521	22.081	31.259
55021	5.614	17.754	18.896	19.359	21.232	23.741	25.920	38.165
55022	1.510	7.677	8.379	8.670	10.623	13.256	15.436	23.236
55023	70.842	16.449	17.488	18.044	20.984	25.080	30.081	43.142
55025	2.229	9.287	10.215	10.574	12.518	15.932	18.217	32.468
55026	6.412	6.408	7.525	8.086	12.527	21.100	29.024	46.715
55028	0.744	14.802	15.729	15.942	17.773	20.283	23.742	32.575

STN NO	MEAN FLOW(M)	MAM(1)	MAM(7)	MAM(10)	MAM(30)	MAM(60)	MAM(90)	MAM(180)
55029	5.862	12.392	13.377	13.772	16.043	19.509	23.099	37.574
55031	0.225	16.947	33.743	35.116	39.657	43.690	48.059	56.916
55033	0.482	9.226	12.109	12.988	16.115	21.222	26.988	44.390
55034	0.203	6.729	7.588	8.317	13.595	25.676	33.469	53.859
55035	0.067	8.965	10.383	10.908	14.540	23.521	32.472	50.531
56001	28.841	15.876	16.805	17.326	20.191	24.661	31.982	47.107
56002	7.405	20.899	22.651	23.249	26.493	31.600	36.168	50.802
56003	1.463	11.184	11.965	12.433	14.845	19.130	24.309	40.965
56004	18.787	12.824	14.232	14.836	19.208	25.798	38.046	53.228
56005	3.115	21.323	22.492	23.159	26.688	32.584	37.617	51.969
56006	6.501	16.315	17.692	18.191	23.274	31.860	43.386	55.777
56007	1.022	8.067	8.975	9.299	12.222	18.927	24.379	44.935
56008	0.213	19.972	21.046	21.547	25.204	30.148	35.054	49.635
56012	2.008	16.448	17.002	17.517	19.785	25.724	30.053	45.733
56013	1.926	10.183	10.927	11.308	13.845	18.581	22.469	38.155
56015	1.526	7.023	7.360	7.517	8.446	10.013	11.787	27.728
57004	4.187	12.515	13.478	14.047	16.530	22.600	28.377	43.522
57005	18.491	18.399	19.233	19.720	22.258	27.602	32.274	47.084
57006	5.298	13.339	14.410	14.878	18.339	25.933	33.352	48.880
57007	6.576	20.604	21.512	21.924	24.045	28.344	31.176	45.294
57008	5.440	14.446	15.816	16.384	19.263	24.245	28.083	43.460
57009	4.317	11.774	12.614	13.191	16.522	21.444	27.154	42.930
57010	1.401	9.636	10.502	11.006	13.882	19.627	26.784	43.530
57011	0.345	5.212	5.460	6.297	9.820	13.068	22.899	41.128
57012	0.218	3.674	4.625	4.753	6.269	11.244	15.833	34.714
57015	3.368	20.715	21.464	21.680	23.623	27.919	31.586	46.813
58001	6.278	13.265	14.714	15.583	19.488	26.404	35.361	53.603
58002	10.139	7.378	8.084	8.402	11.021	19.747	27.845	47.104
58005	3.505	12.949	13.855	14.415	17.506	22.685	30.591	50.975
58006	3.047	10.242	10.892	11.091	13.173	19.678	25.853	45.094
58008	1.881	11.518	12.680	13.130	15.760	21.990	29.320	46.948
58009	1.827	20.646	22.102	22.864	26.085	30.576	35.736	50.990
58010	0.507	5.519	6.245	6.431	8.120	12.938	22.653	42.431
58011	1.012	16.348	17.337	17.904	20.937	24.967	29.585	45.133
59001	11.875	10.887	12.018	12.476	16.313	24.618	35.125	53.628
59002	2.040	14.306	15.294	15.695	18.445	23.498	28.787	47.256
60002	11.217	7.830	8.956	9.453	13.648	20.185	27.734	45.386
60003	7.292	11.664	12.658	13.052	15.329	18.069	22.051	38.152
60004	1.274	8.015	8.745	9.070	11.150	13.849	19.647	38.015
60005	2.222	4.001	4.523	4.867	7.177	12.990	20.086	38.085
60006	4.893	8.152	8.950	9.308	11.436	15.535	21.729	40.593
60007	8.811	5.811	6.737	7.332	14.601	22.842	29.059	45.835
60009	3.342	9.761	11.180	11.560	14.403	20.073	27.767	47.620
60010	39.110	13.283	14.371	15.087	20.861	27.176	37.805	54.484
60012	0.702	3.416	4.166	4.569	7.585	13.978	23.387	43.305
60013	9.042	6.098	7.778	7.971	11.054	15.744	22.497	44.141
61002	5.645	15.139	16.479	17.401	22.317	27.610	33.692	51.756
61003	1.132	12.020	13.013	13.483	17.181	20.935	25.766	42.704
62001	28.282	10.981	11.916	12.741	16.408	21.951	27.460	45.114
62002	14.188	9.872	10.902	11.226	13.533	19.179	23.186	36.161

STN NO	MEAN FLOW(M)	MAM(1)	MAM(7)	MAM(10)	MAM(30)	MAM(60)	MAM(90)	MAM(180)
63001	5.874	8.162	9.466	10.113	15.529	24.564	33.036	50.046
63003	1.062	4.424	4.895	4.942	7.132	10.326	18.451	50.381
63005	0.035	14.396	16.042	18.139	41.845	56.049	59.952	69.181
64001	22.788	7.653	9.201	9.754	15.191	25.416	32.473	49.201
64002	4.585	9.061	11.590	12.718	18.717	29.154	37.270	58.281
64006	1.106	11.241	12.473	13.042	18.049	25.812	33.479	54.025
64007	0.053	7.568	8.379	8.892	11.100	21.064	31.891	38.933
64008	0.120	0.836	1.553	1.589	2.816	6.399	7.426	14.381
65001	5.748	6.867	8.458	8.904	16.404	29.929	41.664	59.918
65004	2.268	6.295	7.258	7.846	12.192	20.365	33.385	58.379
65005	0.613	15.193	16.281	17.159	20.368	25.211	29.691	45.652
65006	4.672	10.079	11.152	11.623	18.699	29.632	38.306	56.552
65007	2.542	7.097	8.563	9.049	14.741	24.600	34.113	55.791
66001	6.044	15.696	16.715	17.117	19.524	23.115	27.188	42.276
66002	4.388	8.395	9.407	9.824	11.840	16.164	24.707	43.173
66004	0.722	35.815	36.816	37.365	40.021	43.847	48.245	57.880
66005	1.219	3.549	4.314	4.595	5.747	7.167	10.189	29.618
66006	4.180	8.416	9.097	9.512	11.003	14.901	17.796	31.735
66011	18.163	5.050	6.067	6.582	12.077	20.211	27.165	47.151
67005	3.002	15.671	16.863	17.461	20.074	24.977	31.006	49.743
67008	2.394	19.215	20.315	20.775	23.141	25.901	28.269	41.491
67009	0.701	0.000	0.000	0.000	0.000	3.328	2.290	10.279
67010	0.620	6.877	7.397	7.782	11.378	18.319	31.237	53.945
67013	1.212	8.568	9.281	9.695	12.579	18.391	24.864	45.606
67016	0.604	7.947	8.727	8.956	11.787	23.578	47.486	54.921
67018	3.111	5.517	6.352	6.757	10.529	18.682	26.899	48.764
68001	5.577	22.061	24.184	24.978	29.215	33.909	37.563	48.348
68003	5.496	17.819	19.281	20.075	26.479	33.925	38.750	50.816
68004	0.804	23.833	28.206	29.281	35.928	40.449	45.002	56.887
68005	1.661	15.587	17.044	17.642	21.114	24.857	28.231	41.324
68006	2.958	16.295	17.425	18.238	21.987	23.806	28.951	45.322
68007	1.796	15.176	16.741	17.257	19.866	24.113	29.105	37.769
68011	0.383	3.655	4.093	4.282	6.349	7.194	9.537	22.827
68015	0.409	21.258	24.590	25.412	30.670	34.358	38.566	49.904
68020	1.246	21.248	23.098	23.659	27.110	32.221	35.841	46.348
69008	0.601	21.285	26.987	28.037	30.575	37.599	47.853	62.587
69012	1.254	38.224	40.959	41.380	48.863	56.048	61.585	72.560
69013	0.516	22.472	24.963	24.913	33.017	39.468	43.149	48.231
69017	3.885	18.839	20.252	20.991	24.623	30.238	34.550	49.086
69020	0.890	27.338	31.230	32.221	40.602	47.388	54.019	66.776
70002	3.796	16.995	21.735	23.533	32.826	42.042	47.082	63.546
70004	1.936	21.936	24.260	24.834	28.953	33.845	37.233	49.491
71001	33.300	11.668	12.921	13.564	19.086	25.914	34.526	53.205
71004	8.714	19.839	21.229	21.861	26.530	32.091	36.521	53.256
71006	13.670	6.191	6.812	7.197	11.687	17.488	23.479	46.027
71009	35.551	10.957	11.401	11.666	16.209	22.454	26.987	46.893
71010	2.753	18.000	19.151	19.645	23.599	27.713	31.575	51.918
71011	7.761	5.233	5.552	5.829	10.565	18.059	22.260	43.162
72001	33.685	8.459	9.766	10.670	17.397	25.417	37.456	58.705
72002	6.670	7.028	8.900	9.864	16.464	23.610	30.611	48.379

STN NO	MEAN FLOW(M)	MAM(1)	MAM(7)	MAM(10)	MAM(30)	MAM(60)	MAM(90)	MAM(180)
72004	34.867	7.973	9.055	9.825	15.911	23.846	33.585	53.888
72005	8.744	7.528	8.253	8.612	12.123	17.650	25.393	49.085
72007	0.912	8.044	9.381	9.885	15.909	25.393	28.830	51.374
72008	3.350	8.507	9.664	10.165	15.007	20.829	27.715	49.280
72009	3.955	6.711	7.356	7.683	11.913	18.591	22.288	41.792
72011	10.245	6.477	7.036	7.380	11.340	18.540	27.497	48.558
72015	6.398	5.502	6.082	6.489	7.814	15.061	27.081	56.510
72804	7.386	12.036	12.565	13.556	20.841	27.353	32.999	58.972
72811	0.835	2.993	3.506	3.951	6.285	10.311	16.016	41.892
72814	0.277	4.818	5.851	6.144	8.713	12.066	15.981	40.026
72817	0.689	2.901	3.212	3.917	5.875	8.535	9.429	28.022
72818	1.028	1.946	2.433	2.724	4.768	6.633	7.195	29.087
72820	0.020	0.000	0.000	0.000	9.596	19.274	28.843	49.523
73002	4.057	10.033	11.710	12.462	17.265	25.976	35.143	55.917
73003	3.659	6.829	7.632	8.144	10.801	16.017	20.797	38.749
73005	8.553	10.600	11.837	12.466	16.780	22.883	30.083	52.407
73008	3.492	13.120	13.771	14.092	16.653	20.231	25.716	45.193
73009	1.846	7.318	8.122	8.564	12.359	21.530	28.793	48.873
73010	13.845	6.939	8.365	9.179	15.617	25.922	37.077	56.718
73011	2.342	5.754	6.738	7.077	10.974	17.288	24.037	48.143
73013	4.185	6.548	7.917	8.997	14.180	28.933	40.644	65.940
74001	4.990	6.948	7.935	8.582	13.098	20.635	30.790	53.992
74002	3.227	9.436	11.044	11.624	17.061	26.762	38.766	61.087
74003	2.479	12.367	14.499	14.893	16.644	20.048	26.514	47.346
74005	5.159	13.961	15.155	15.671	18.302	22.252	28.186	48.481
74007	4.506	6.700	7.838	8.695	14.306	24.772	35.710	57.192
75002	25.470	11.928	13.125	13.708	18.118	25.059	33.530	53.334
75003	16.454	9.189	10.082	10.664	14.669	21.545	27.828	49.247
75004	5.098	10.691	11.785	12.178	15.415	21.241	27.854	50.100
75006	1.651	1.656	2.566	3.029	6.465	12.146	22.458	48.723
75007	2.275	6.632	7.241	7.592	10.100	14.091	20.038	42.880
75009	5.197	10.028	10.705	11.028	14.515	19.831	24.068	42.885
75010	0.814	12.018	12.734	13.067	16.174	19.025	23.307	42.156
75017	2.393	11.261	12.072	12.481	14.965	18.100	23.132	42.439
76002	34.051	16.720	18.066	18.694	22.538	28.360	34.145	52.410
76004	3.527	18.792	19.695	20.043	22.304	25.693	29.731	43.982
76005	14.203	12.386	13.096	13.523	17.376	23.224	29.640	48.508
76007	49.357	18.504	19.348	19.830	23.829	29.630	34.806	52.406
76008	7.102	12.859	13.636	14.193	19.418	27.873	34.786	55.313
76009	4.653	16.325	17.332	17.748	21.027	26.420	30.725	48.641
76010	2.117	13.261	14.459	14.787	17.316	20.699	23.699	38.364
76011	0.046	0.606	1.040	1.492	5.001	16.248	28.138	53.942
76014	2.559	4.343	4.851	5.135	8.429	14.614	21.630	44.617
76805	0.128	2.346	3.575	4.067	5.096	8.902	14.168	43.748
77001	25.185	11.481	12.270	12.628	16.464	23.236	30.660	51.303
77002	16.869	11.042	11.866	12.428	16.536	25.310	34.261	55.245
77003	10.305	9.224	9.841	10.143	12.697	21.807	28.182	49.940
77004	1.825	6.130	6.818	7.235	9.475	17.048	24.389	48.794
77005	5.766	7.932	8.444	8.867	11.580	24.069	32.723	54.652
78003	28.041	10.718	11.476	11.884	14.563	20.874	26.407	49.568

STN NO	MEAN FLOW(M)	MAM(1)	MAM(7)	MAM(10)	MAM(30)	MAM(60)	MAM(90)	MAM(180)
78004	2.605	3.619	4.424	4.920	7.722	15.297	21.447	46.414
78005	8.046	7.702	8.420	8.834	11.193	18.492	25.230	48.311
78006	8.909	10.005	10.966	11.539	14.540	22.226	29.212	51.180
79002	26.286	9.248	10.312	10.870	14.481	20.392	26.754	47.133
79003	5.393	5.436	6.313	6.678	10.383	16.240	22.389	42.579
79004	5.349	4.850	5.689	6.233	9.341	16.966	24.138	47.097
79005	7.627	6.066	6.901	7.288	10.153	16.821	23.199	45.124
79006	16.054	7.270	8.005	8.632	11.649	16.949	22.113	42.555
80001	5.793	3.864	4.435	4.758	7.258	13.226	19.116	41.928
80003	0.397	2.464	3.420	4.203	11.086	25.373	34.233	56.760
80004	0.289	1.592	2.028	2.423	7.362	17.535	30.691	48.650
80005	0.163	4.615	5.362	5.876	13.019	23.075	32.679	56.388
80006	1.131	4.757	5.596	6.166	11.261	19.264	28.536	53.176
81002	15.314	4.047	5.152	6.027	11.870	22.143	30.390	51.596
81003	5.941	3.636	4.200	4.590	7.979	14.035	21.304	44.209
81004	10.391	3.204	3.636	3.941	6.522	12.077	19.184	42.427
81005	0.790	7.946	8.661	8.807	11.134	18.651	27.789	52.995
81006	7.346	3.811	4.960	6.129	13.281	22.573	30.557	61.144
81007	2.744	3.645	3.764	3.878	7.713	13.647	15.836	43.485
82001	6.381	6.215	7.808	8.488	11.764	17.939	23.609	42.149
82003	10.841	3.275	3.821	4.384	8.001	14.418	21.069	41.199
83003	4.902	8.948	10.274	10.969	14.093	19.074	24.697	45.665
83004	5.535	4.479	5.354	5.952	8.895	13.447	18.451	38.012
83005	9.398	3.889	4.692	5.176	8.723	12.487	17.350	40.463
83006	15.766	7.216	8.311	8.856	11.857	16.642	21.498	42.783
83007	1.679	4.194	5.010	5.421	7.536	12.333	18.371	42.119
83008	3.193	6.612	7.235	7.739	10.463	14.837	22.421	39.394
83009	6.513	2.703	3.417	3.959	6.755	12.377	19.472	42.620
83010	2.839	13.256	14.071	14.666	18.567	23.653	29.884	52.040
84003	26.081	17.472	19.336	19.842	23.415	29.136	34.174	52.001
84004	17.840	17.666	19.531	20.119	23.782	29.122	34.318	52.412
84005	40.778	16.342	18.315	18.791	22.250	27.581	32.511	50.265
84012	6.692	11.930	13.016	13.639	17.026	22.373	26.264	45.396
84013	44.928	17.801	19.797	20.422	23.898	29.403	33.867	51.298
84014	7.527	5.742	6.418	6.820	10.011	15.709	20.957	42.350
84015	6.492	15.280	16.789	17.425	22.426	29.495	36.466	54.194
84016	0.857	13.281	14.797	15.392	18.279	22.911	27.087	46.153
84018	24.291	14.882	15.645	16.074	19.662	24.696	28.154	47.523
84020	1.921	6.708	7.382	7.794	11.414	17.746	24.997	48.419
84022	3.093	12.487	13.771	14.131	17.782	23.828	28.071	48.735
84025	2.381	12.216	13.634	14.148	17.017	21.716	25.810	44.335
84026	1.282	6.667	7.672	8.039	11.817	16.487	22.559	46.219
84029	0.556	5.280	6.510	6.733	9.115	12.310	15.736	33.628
84030	3.761	8.987	9.670	10.178	13.274	17.007	23.025	42.901
85001	41.025	32.610	34.275	35.421	41.233	48.325	53.763	65.960
85002	6.974	7.268	8.366	8.759	11.561	17.609	23.052	44.411
85003	5.501	2.561	3.105	3.676	9.846	19.667	29.592	51.949
85004	2.736	4.203	5.004	5.626	10.614	17.542	26.729	55.875
87801	0.319	3.273	4.939	5.609	20.087	36.338	47.382	64.367
89008	0.437	4.713	6.347	8.497	17.734	26.141	34.437	54.210

STN NO	MEAN FLOW(M)	MAM(1)	MAM(7)	MAM(10)	MAM(30)	MAM(60)	MAM(90)	MAM(180)
89009	0.748	2.206	3.130	4.405	12.883	21.394	32.000	54.303
89805	4.703	4.780	5.452	6.032	11.654	17.978	24.497	46.582
89807	1.749	4.393	5.151	5.777	11.633	24.142	28.307	57.021
90002	4.479	4.436	6.078	6.761	14.571	20.892	27.210	58.188
90003	6.463	6.368	7.295	8.032	16.502	26.077	33.623	57.091
93001	10.832	6.654	7.526	8.129	15.278	29.307	35.463	55.627
94001	28.722	14.032	15.294	16.054	23.394	30.990	37.774	56.900
95001	8.428	17.149	19.020	19.789	25.809	35.371	42.308	58.386
96001	4.973	4.663	5.297	5.679	9.816	17.595	22.891	42.854
96002	15.482	7.603	8.396	8.802	14.391	19.023	24.721	44.620
96003	2.449	6.064	6.483	6.686	10.317	20.807	30.539	53.979
97002	8.605	7.225	7.741	8.022	11.491	18.910	23.813	40.315
101005	0.201	29.321	32.394	33.019	39.439	45.713	49.024	57.464
101006	0.151	7.938	18.664	21.697	31.068	36.233	39.947	50.986
101007	0.109	11.679	13.773	14.794	17.565	19.667	22.926	34.007
201002	5.176	4.789	5.737	6.345	9.060	15.158	22.981	41.701
201005	6.737	11.952	13.788	14.597	18.776	23.923	29.789	47.528
201006	8.039	6.316	7.094	7.621	10.546	15.896	21.332	41.256
201007	3.925	21.682	22.976	23.825	29.003	36.084	42.371	58.614
201008	13.515	3.174	4.445	5.177	9.522	19.171	28.383	49.729
201009	16.216	13.237	14.354	15.268	21.011	28.406	35.344	52.605
201010	55.001	8.775	10.341	11.096	15.207	21.250	29.156	48.374
202002	8.206	18.092	19.218	20.395	25.809	34.947	39.483	59.698
203010	16.974	3.795	5.881	6.213	9.440	14.149	19.851	39.002
203011	5.710	10.113	11.249	11.808	16.443	22.390	25.402	42.115
203012	8.642	16.442	18.277	18.887	21.967	26.713	31.914	49.119
203013	15.259	11.662	12.445	13.011	16.810	23.367	28.134	45.245
203017	5.106	8.157	9.364	9.948	13.410	17.745	22.154	36.227
203018	5.941	14.320	15.724	16.331	20.663	26.237	31.626	47.578
203019	3.247	8.867	10.151	10.606	13.773	18.921	23.182	41.128
203020	8.135	12.704	14.716	15.593	19.199	24.860	31.036	47.998
203021	3.265	4.667	5.829	6.468	9.796	16.961	22.875	42.807
203024	3.294	3.255	4.131	4.400	6.962	10.873	15.268	33.038
203025	2.768	16.545	17.898	18.569	21.951	25.728	29.435	43.018
203026	0.721	13.994	15.911	16.639	20.390	27.859	34.895	49.642
203028	2.804	8.804	10.106	10.594	14.851	23.566	29.875	45.791
203029	1.617	9.836	10.936	11.518	14.392	19.265	25.928	44.367
203033	2.771	6.688	8.054	8.564	10.621	17.070	24.440	37.899
203042	1.045	6.627	7.813	8.375	11.871	18.801	26.326	44.326
204001	6.969	12.389	13.782	14.444	18.203	24.850	28.657	41.515
205003	7.087	7.851	9.490	10.106	13.200	18.119	22.546	36.569
205004	9.038	9.600	11.271	11.689	15.280	21.280	25.857	41.801
205005	1.011	2.286	2.738	3.068	5.179	8.428	12.914	31.329
205006	4.487	5.747	6.461	6.756	8.444	10.884	13.873	26.888
205008	1.842	5.126	5.862	6.052	8.698	14.101	21.618	41.180
205010	2.630	1.468	1.710	1.860	2.903	4.908	6.970	23.937
205020	0.857	10.459	11.734	12.404	15.398	20.175	27.231	42.558
206001	2.294	6.078	6.626	6.713	8.825	13.322	17.184	29.074
206002	0.737	5.565	6.305	6.826	9.207	13.203	17.222	33.445
236005	6.784	10.068	11.306	11.629	15.471	21.124	26.661	44.781
236007	4.448	4.370	5.675	6.226	12.366	23.501	29.521	46.180

Appendix 6 Feasibility study for standard period low flow statistics

Section 3.3.2 highlighted the change in both Q95(1) and MAM(7) between data analysed up to 1975 compared with 1989. Assuming that there is no trend in hydrological time series, then the longer the period of record, the smaller will be the sampling error of any derived statistic. However, difficulties do arise from analysing all the available data, notably the change of flow statistics with time and inconsistencies in comparing statistics between different flow records. These disadvantages can be overcome by deriving standard period low flow statistics, a concept used by the Meteorological Office for deriving a standard period 1941-70 (to be replaced by 1961-90) for average annual rainfall. This Appendix presents the results of applying a simple procedure for deriving standard period flow statistics from short flow records in the NRA Welsh Region. This region was selected because it represents a typical range of lengths of records for the UK, for stations whose records are relatively natural.

Inspection of the flow records on the National River Flow Archive identified 14 stations with complete flow data from 1971-1988, and Low Flow station grades of A or B. The locations of these stations are shown in Figure A6.1 and their flow statistics are listed on Table A6.1.

Table A6.1 Flow statistics 1971-1988

Number	Name	NGR	Area km^2	Mean Flow $m^3 s^{-1}$	Q95(1) % mean flow	MAM(7) % mean flow
55013	Arrow at Titley Mill	SO 328585	126.4	2.383	12.512	14.561
55014	Lugg at Byton	SO 364647	203.3	3.865	18.415	20.569
55025	Llynfi at Three Cocks	SO 166373	132.0	2.240	8.877	10.491
55026	Wye at Ddol Farm	SN 976676	174.0	6.709	6.420	5.947
56005	Lwyd at Ponthir	ST 330924	98.1	3.133	20.722	22.981
56007	Senni at Pont Hen Hafod	SN 928255	19.9	1.007	10.029	9.434
57004	Cynon at Abercynon	ST 079956	106.0	4.265	12.634	13.060
57005	Taff at Pontypridd	ST 079897	454.8	18.501	19.416	19.567
59002	Loughor at Tir-y-dail	SN 623127	46.4	2.040	14.451	15.490
60006	Gwili at Glangwili	SN 431220	129.5	4.943	8.507	9.144
62001	Teifi at Glan Teifi	SN 244416	893.6	28.352	9.824	10.747
64006	Leri at Dolybont	SN 635882	47.2	1.501	8.448	13.125
67008	Alyn at Pont-y-capel	SJ 336541	227.1	2.338	20.556	20.573
67018	Dee at New Inn	SH 874308	53.9	3.115	7.191	6.295

The mean flow (MF), Q95(1) and MAM(7) were calculated for each station, for individual years 1971-1988, and the mean for 1971-1988. For each index the value for individual years was expressed as a fraction of the 1971-1988 mean to derive MFFRAC, Q95(1)FRAC and MAM(7)FRAC. In the case of the flow duration curve individual year Q95(1) values were expressed as a fraction of Q95(1) derived from the 1971-1988 period. These are shown on Figures A6.2a, b and c. The average fraction for all 14 stations was calculated for each individual year to produce a standardising array of MFFRAC, Q95(1)FRAC and MAM(7)FRAC. These are listed on Table A6.2 and plotted on Figure A6.3.

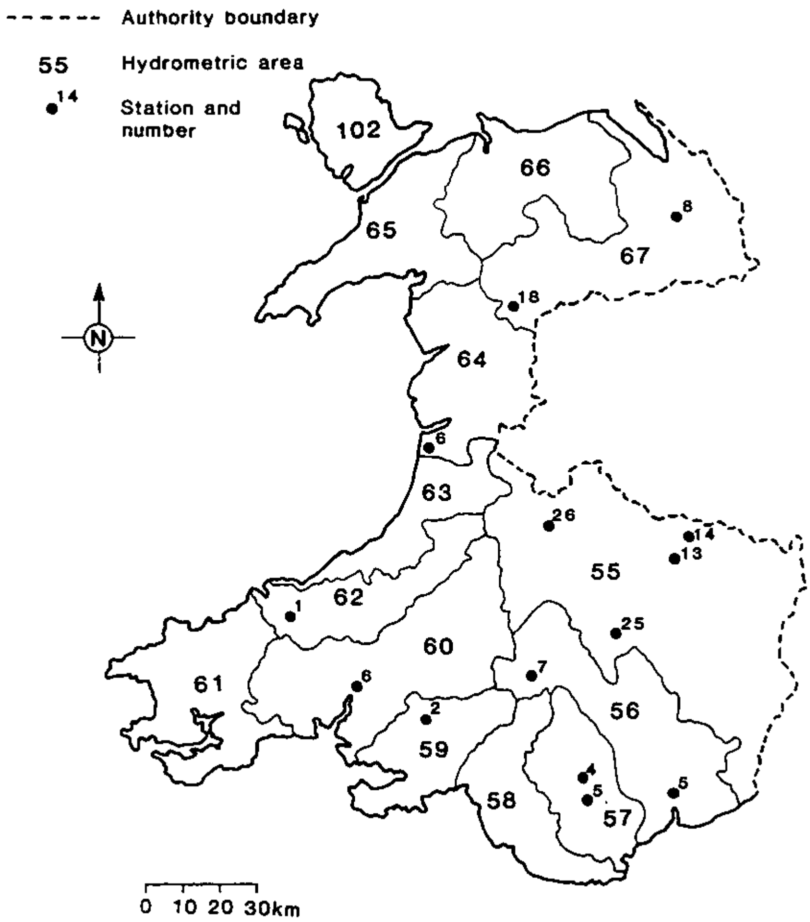

Figure A6.1 *Location of stations used in feasibility study*

These mean fractions were then used to adjust indices from shorter periods of record to the standard period (SP). For example, for a station with flow data for a period of record, say 1971-1980

$$SPMF\ (71-88) = \frac{MF\ (71-80)}{MFFRAC\ (71-80)}$$

Standard period, 1971-1988, indices SPMF, SPQ95(1) and SPMAM(7) were derived in this way for all stations in the area of this study which have an A or B grade and which have periods of missing data in the years 1971-1988. These derived indices are presented in Table A6.3 together with those calculated from available gauged data. Note that the mean flow is expressed in $m^3\ s^{-1}$ and the flow statistics as a percentage of the mean. The gauged and standard period flow statistics generally differ by less than 3% of the mean flow. As would be expected differences in the gauged and standard period mean flow are greatest for those stations with more missing years. Differences of the order of 15% are found when more than half the period is missing.

Figure A6.3 illustrates the lower annual variability of the mean flow than of both low flow statistics. In the case of the 95 percentile statistic in most years Q95(1)FRAC is greater than 1.0. This is a result of the long term Q95(1) derived from the complete time series of data

Table A6.2 *Standardising array showing flow statistics as a fraction of the long term mean*

Year	MEAN FRACTION MFFRAC	Q95(1)FRAC	MAM(7)FRAC
1971	0.734	1.625	1.027
1972	1.082	1.003	0.898
1973	0.664	1.873	0.903
1974	1.212	1.150	1.118
1975	0.712	1.242	0.703
1976	0.723	0.703	0.388
1977	1.111	1.031	0.908
1978	0.909	1.309	0.980
1979	1.160	1.051	0.939
1980	1.088	1.269	1.058
1981	1.160	1.029	0.881
1982	1.205	1.104	1.079
1983	1.033	1.089	0.817
1984	0.951	0.664	0.517
1985	1.030	2.269	1.915
1986	1.198	1.190	1.172
1987	0.955	1.480	1.126
1988	1.082	1.928	1.560
Mean	1.000	1.278	1.000

being lower than the mean of the individually derived annual Q95(1) values. The mean value of Q95(1)FRAC was 1.278 (Table 1) and this was used to adjust annual based Q95 values to the period of record Q95 values shown on Table A6.3. This highlights the bias which can be introduced in estimating the flow duration curve from a short unrepresentative record which may either be lacking or be dominated by extended periods of low flows. This was also identified in Section 3.3.2 where Q95(1) flow statistics used in this report were on average 14% lower than in the 1980 report.

The standard period low flow statistics shown on Table A6.3 have been derived using a simple ratio procedure. Alternative strategies include developing regression models between adjacent catchments or using rainfall runoff models to infill data using daily rainfall and evaporation for the ungauged period. It is important that a modelling approach estimates low river flows accurately. Given the sampling variability of low flow statistics there are clear advantages in using standard period statistics for design purposes. The increasing availability of key stations with long flow records in the UK enables an operational procedure for calculating standard period statistics to be established in the future. Derived statistics could be updated at regular five or ten year intervals.

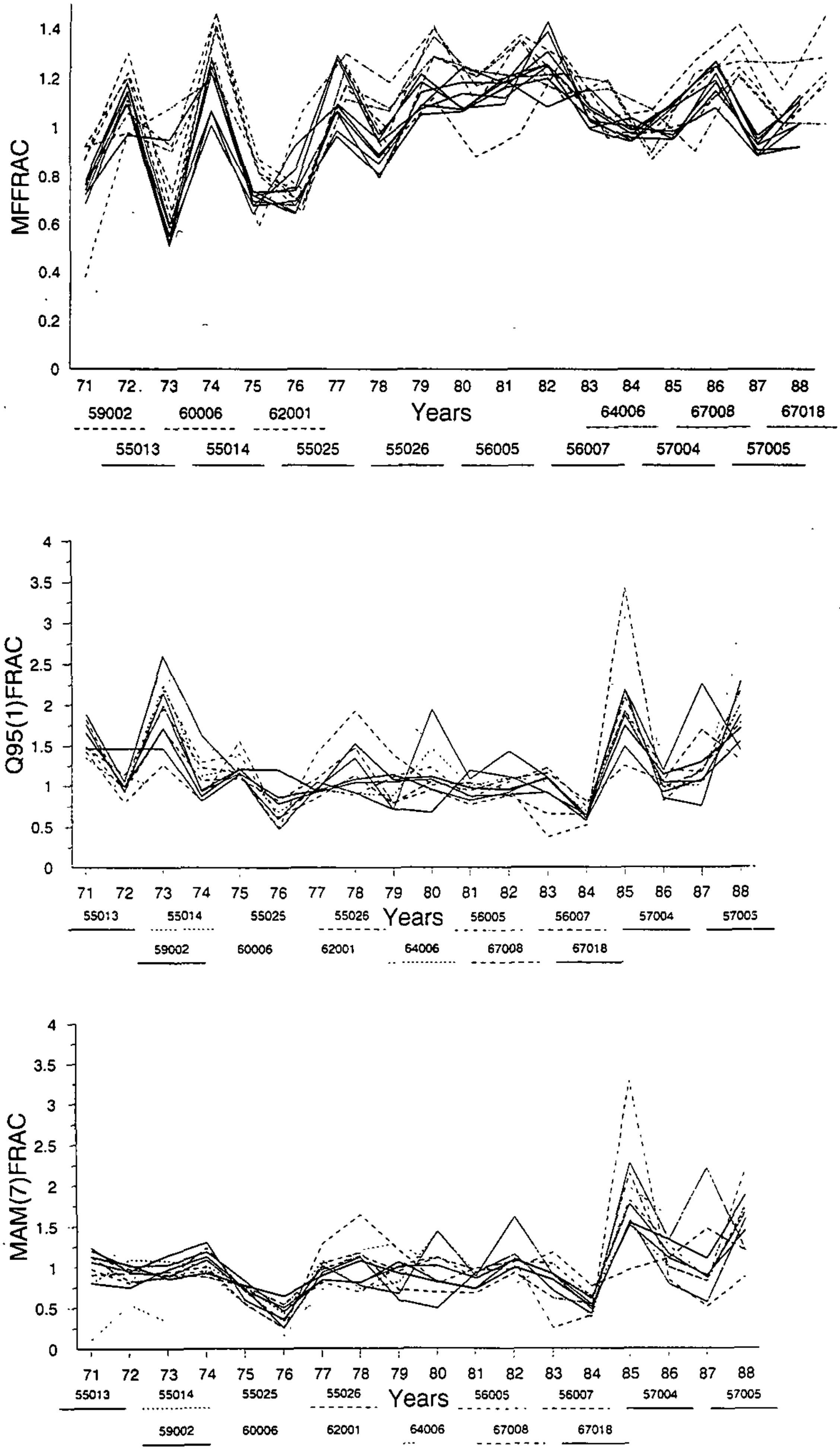

Figure A6.2 a) MFFRAC, b) Q95(1)FRAC, c) MAM(7)FRAC for each station

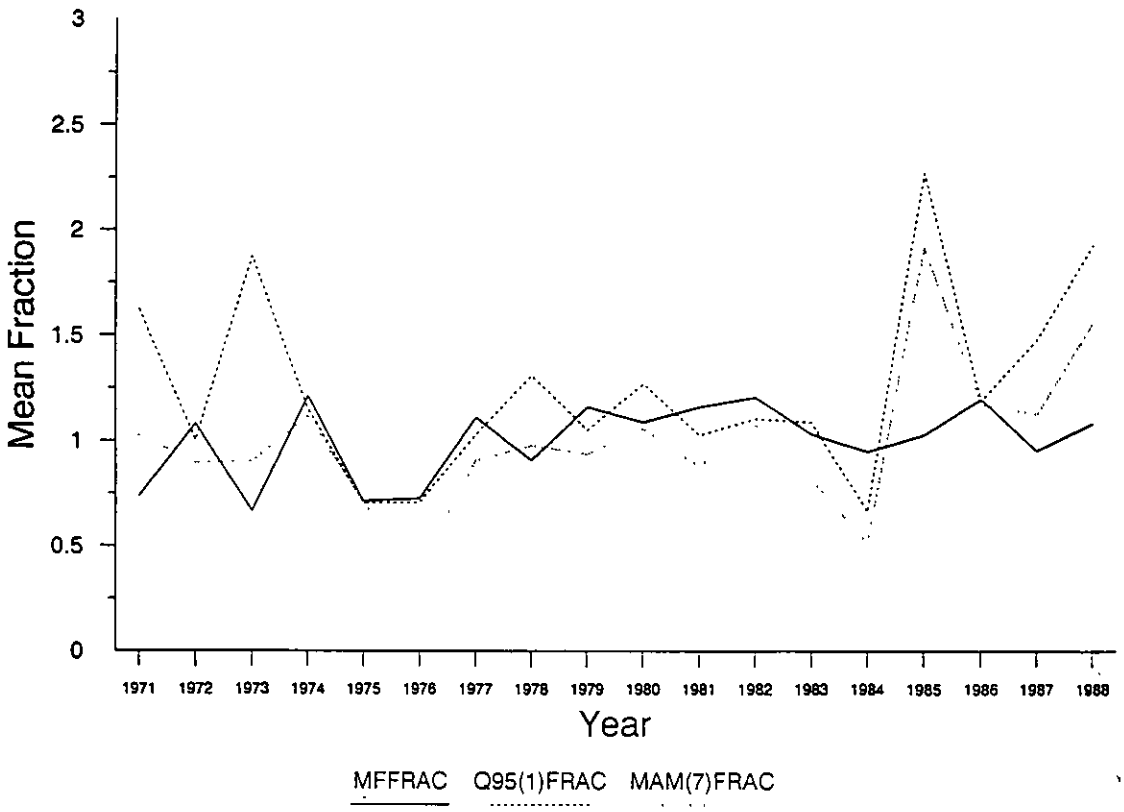

Figure A6.3 Mean value of MFFRAC, Q95(1)FRAC & MAM(7)FRAC for all stations

Table A6.3 *Comparison of derived standard period (1971-1988) and gauged period of record low flow indices*

Station	Period of record	Number of missing years during 71-88	Mean Flow cumecs Gauged	Mean Flow cumecs Standard Period	Q95(1) % mean flow Gauged	Q95(1) % mean flow Standard Period	MAM(7) % mean flow Gauged	MAM(7) % mean flow Standard Period
55003	39-81	8	10.845	11.543	16.779	17.860	17.310	19.400
55004	37-82	9	3.185	3.451	9.026	9.943	7.810	9.053
55008	51-88	1	0.681	0.675	9.232	9.324	8.408	8.304
55010	55-82	10	1.625	1.806	7.946	8.255	6.967	7.786
55011	59-82	8	2.553	2.697	4.403	4.683	3.855	4.389
55012	66-88	2	10.290	10.297	7.347	7.268	7.996	7.948
55016	68-88	1	9.164	9.203	3.620	3.575	4.022	3.994
55018	68-88	1	1.201	1.212	13.146	13.007	14.596	14.525
55021	69-88	4	5.628	5.784	16.294	15.374	19.857	19.291
55022	69-82	10	1.487	1.665	7.869	8.696	8.738	10.098
55028	71-88	3	0.731	0.733	14.703	14.601	15.774	16.122
55029	48-88	2	5.921	5.962	11.101	11.658	13.533	13.695
55031	73-88	3	0.225	0.218	24.496	24.795	33.743	33.344
55033	69-88	6	0.274	0.267	15.292	17.153	12.566	15.029
55034	73-88	8	0.203	0.194	8.226	8.740	7.588	7.617
55035	73-88	5	0.067	0.064	8.836	10.634	10.383	10.503
56002	57-88	3	7.438	7.216	21.275	20.358	22.616	21.213
56003	63-81	7	1.417	1.477	9.957	10.536	10.775	12.116
56012	71-81	7	2.009	2.094	17.060	18.053	17.002	19.044
56013	72-81	2	1.894	1.897	10.162	10.129	11.168	11.390
57006	70-88	4	5.301	5.488	13.486	13.030	14.723	14.553
57007	73-88	3	6.578	6.354	20.344	21.071	21.512	21.282
57008	73-88	2	5.428	5.363	15.101	15.151	16.125	16.056
57009	75-88	4	4.345	4.248	12.832	13.227	12.651	12.598
57015	78-88	8	3.424	3.153	23.345	22.821	22.196	20.058
58001	63-88	1	6.179	6.249	12.816	12.760	13.405	13.545
58005	70-88	2	3.473	3.514	15.261	14.579	14.263	14.030
58006	71-88	2	3.047	3.012	11.339	11.526	11.055	11.125
58008	71-88	5	1.874	1.879	12.569	13.277	12.857	13.774
58009	71-88	3	1.784	1.778	19.614	19.681	22.186	22.803
58011	76-88	6	1.033	0.962	14.239	14.168	17.515	16.233
59001	57-88	4	12.219	12.274	11.374	11.660	13.020	13.484
60002	61-88	5	11.181	11.300	6.390	6.315	7.602	7.561
60003	65-88	3	7.361	7.364	9.713	9.702	10.819	10.892
60004	69-81	8	1.274	1.297	8.992	9.855	8.745	9.927
60005	68-88	1	2.244	2.253	4.533	4.476	4.643	4.611
60012	70-81	11	0.703	0.782	5.335	5.520	4.166	4.835
61003	69-88	3	1.141	1.123	13.181	14.057	12.612	13.262
63001	63-88	1	5.938	5.967	9.256	9.250	8.952	8.977
64001	62-88	10	23.671	22.230	6.655	6.123	7.615	6.643
64002	66-88	6	4.841	4.509	11.726	11.667	10.223	9.436
65001	61-88	3	5.994	5.840	8.019	8.219	6.876	6.782
65005	73-88	2	0.620	0.612	15.017	15.067	16.323	16.230
65006	76-88	6	4.674	4.354	12.540	12.477	11.152	10.328
65007	75-88	5	2.565	2.451	8.973	9.250	8.606	8.397
66001	59-80	9	5.739	6.272	15.227	15.631	16.674	18.800
66004	70-76	12	0.693	0.811	34.567	34.895	36.967	44.011
66006	73-88	3	4.203	4.060	8.727	9.039	9.318	9.204
66011	64-88	1	18.026	18.105	6.849	6.670	6.230	6.191
67005	56-76	12	2.560	2.996	12.905	13.028	15.893	18.939
67013	67-76	12	1.076	1.259	9.020	9.106	8.696	10.405