INSTITUTE OF HYDROLOGY

A REVIEW OF THE FLOOD STUDIES REPORT RAINFALL-RUNOFF MODEL PARAMETER ESTIMATION EQUATIONS

by

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ABSTRACT

The Flood Studies Report, published in 1975, presents a method of design flood estimation based on a rainfall-runoff model and a statistically-derived rainfall input. At the heart of the rainfall-runoff model (the unit hydrograph and losses model) are equations relating model parameters to physical and climatological features of the drainage basin that can be abstracted from maps. These parameter estimation equations have been reviewed in the light of an expanded data set and experience gained in ten years' application of the procedure. New equations are presented that ease application and prove more robust under extreme conditions.

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1 INTRODUCTION

The Flood Studies Report (NERC, 1975) presented two methods of design flood estimation suitable for use at ungauged sites. One of these is based on a rainfall-runoff model and uses a statistically derived rainfall event as input to give an estimate of the flood magnitude of required return period. Since publication of the report more event data have been collected and analysed enabling a review of the method and in particular its parameter estimation equations. The collection of new data was partly a response to comments made at the Flood Studies Conference (Institution of Civil Engineers, 1975) and was an attempt to collect more data on catchments which had provided few events to the published analyses and also data from extra catchments of types not represented in the FSR data set. This report contains the background to the development of the revised set of recommendations summarised in Flood Studies Supplementary Report Number 16.

At this stage in the life of the Flood Studies Report (FSR) it was thought best to introduce improvements whilst maintaining as much as possible of the existing methodology; if changes were to be recommended then they should be easily slotted in to the present framework. This restriction implies a review of the model parameter estimation equations only and this is what was undertaken. The opportunity of such a review has been taken to consolidate all recommendations concerned with the rainfall-runoff method previously published in the FSR and the Flood Studies Supplementary Reports (FSSR's). In addition, the choice of dependent and independent variables used in the regression analyses has been appraised in an attempt to ease the abstraction of catchment characteristics and solve problems encountered in application under extreme conditions.

The analyses presented in this report parallel those given in the FSR and indeed assume a certain knowledge of the FSR (Volume I, Chapter 6 in particular*) The model used in analysis, the unit hydrograph and losses model, comprising a loss rate rainfall separation changing with catchment wetness and unit hydrograph derivation using matrix inversion with smoothing, is exactly as used previously in the FSR.

2 DATA

The data required for this study are of two types: catchment characteristics obtained from maps and event parameters obtained from observations and analyses. For those catchments and events used in the FSR, these data already existed in a well collated form. For new events, flow, rainfall and soil moisture deficit data were collected and processed as required before analysis. Each event yielded parameters relating to the event, such as rainfall and antecedent flow, and model parameters, such as unit hydrograph time to peak and percentage runoff. Where the new events were from catchments for which event data had not previously been collected then the pertinent catchment characteristics were abstracted.

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*References to the Flood Studies Report will be given in the form Volume, chapter, section eg FSR I,6.1

To aid the storage, collation and analysis of these data a computer data base management system, the Flood Event Data Archive, was developed. This facility, which is described in Appendix B, contained many features not available at the time of the FSR. To aid abstraction of catchment characteristics, catchment boundaries were digitised and stored, thus enabling the production of computer constructed maps with precisely located catchments. The accuracy of these maps showed up many discrepancies in maps used for the FSR and led to the checking of all map derived catchment characteristics. Similarly, the new event analyses revealed that the haste with which the original analyses had been performed had allowed many events to pass the data checking stage that had poorly defined rainfalls or a possible snowmelt contribution. All event data were inspected and coded as being of quality suitable for derivation of a unit hydrograph, only suitable for assessing volumes of rainfall and flow, or of poor quality and not suitable for use in the current study.

These reviews, it was hoped, left a well organised and carefully vetted data set ready for the next stage in the analysis, the generalisation of the model parameters to the ungauged site.

Two tables in Appendix A contain the data. Table A.1 lists all the catchment characteristics abstracted for catchments in this study. Because previously derived values have been reviewed, values may differ from those published earlier. Table A.2 gives the event information and contains both event details and derived model parameters.

At the start of the second phase of data collection it had been hoped that a large increase in the total number of useful events would result. The outcome was somewhat disappointing; although over 900 new events were selected, fewer events were available for unit hydrograph analysis than had been used in the FSR. The table below summarises data availability.

TABLE 2.1 NUMBER OF EVENTS AND CATCHMENTS FOLLOWING DATA VALIDATION

Events	Total (including rejects)	2564 (1631)	
	Volume analysis	1910 (1488)	
	Unit hydrograph	1306 (1351)	
Catchments	Total (at least one event)	210	(138)
	With at least one unit hydrograph event	181	
	With at least five volume analysis events	174	- 1822 events
	With at least five unit hydrograph events	128	- 1159 events

Figures in brackets are for the equivalent FSR data set

The table shows that only half of all events selected were suitable for unit hydrograph modelling and that on many catchments only a few events were available (82 of the 210 catchments were providing less than five events suitable for full analysis). The new data set is larger in terms of numbers of catchments and events suitable for volume analysis and there has been a very small decrease in events suitable for unit hydrograph analysis. That there should be any decrease

at all having collected so much new data reflects the very much more stringent checking and acceptability criteria that were applied in the review.

Before deriving the ungauged catchment regressions a small data set was withdrawn to provide an independent sample for testing. This comprised six catchments with 59 events, 42 of which were suitable for unit hydrograph studies. Table 2.2 details the test data set.

TABLE 2.2 THE TEST DATA SET

Catchment	unit hydrograph events	loss study events
19001	5(5)	5(5)
29001	7(6)	9(6)
39012	6(8)	11(10) *
40004	11(15)	15(15)
54016	4(12)	7(16)
67010	9(12)	12(12)
Total	42(58)	59(64)

Figures in brackets are for the equivalent FSR data set

*Replaces 29003 withdrawn in FSR

3 UNIT HYDROGRAPH PARAMETER ESTIMATION

The parameters abstracted from the derived unit hydrographs were [illegible] to peak in hours (Tp), peak in cumecs per 100 sq km (Qp), and the width [illegible] of the peak (W), in hours; their definitions are shown graphically in F[illegible].1. If in analysis a data interval other than one hour was used an adjust[illegible] was applied to give equivalent one hour unit hydrograph parameter values (FSR I,6.4.8).

The FSR showed the strong interdependence of the unit hydrograph parameter values and gives expressions for Qp and W in terms of Tp alone. Figures 3.2 and 3.3 show catchment average values of Qp and W plotted against Tp with the lines representing the FSR equations superimposed. As can be seen the equations fit the data reasonably well and there seems to be no need for change. Table 3.1 gives details of regression equations fitted to the new and the original data sets but are intended for information only and are not recommended for use.

Users of the FSR will be aware that the loss model recommended for design use is a percentage one yet a loss rate based model has been used in analysis.

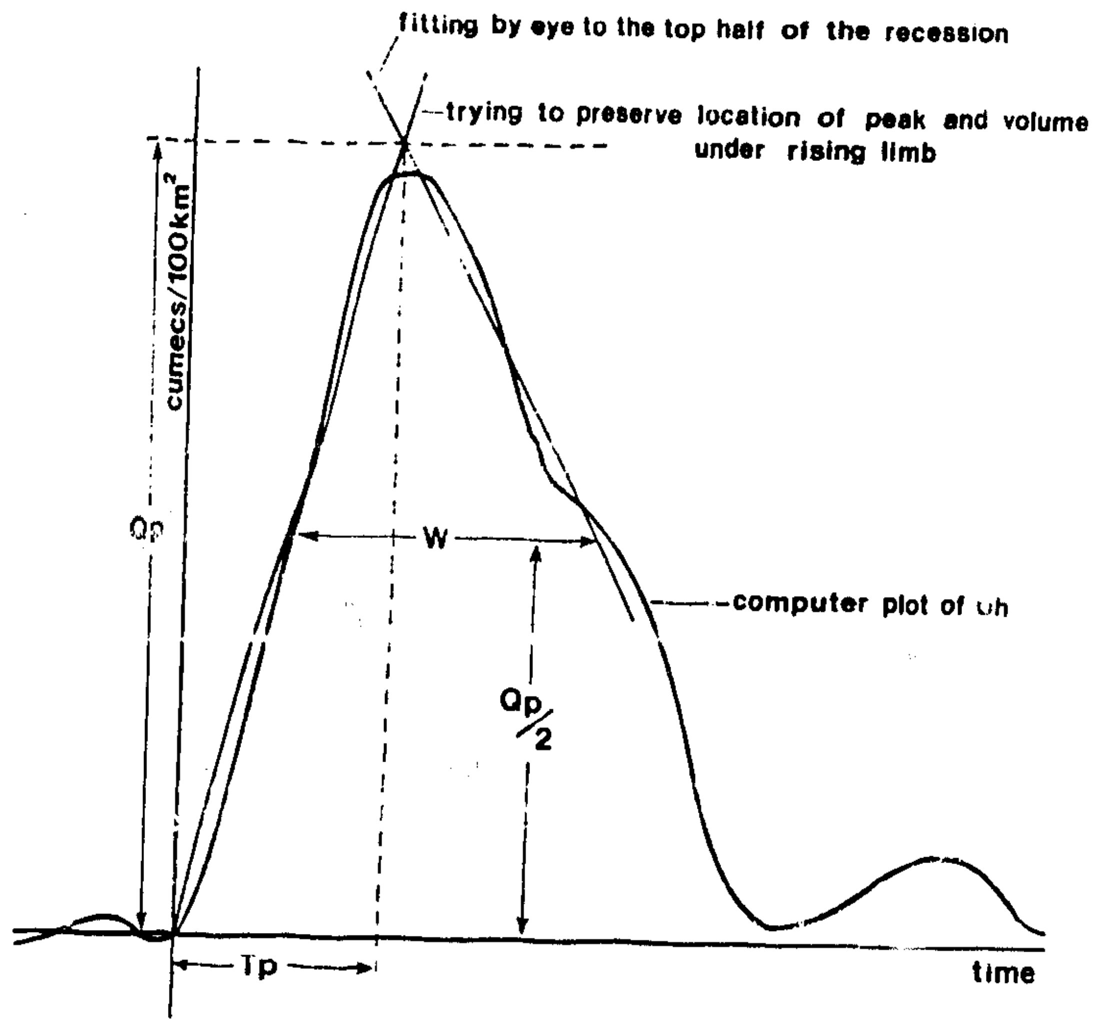


FIGURE 3.1 **Definition and fitting of the FSR parameters of the unit hydrograph Tp, Qp and W**

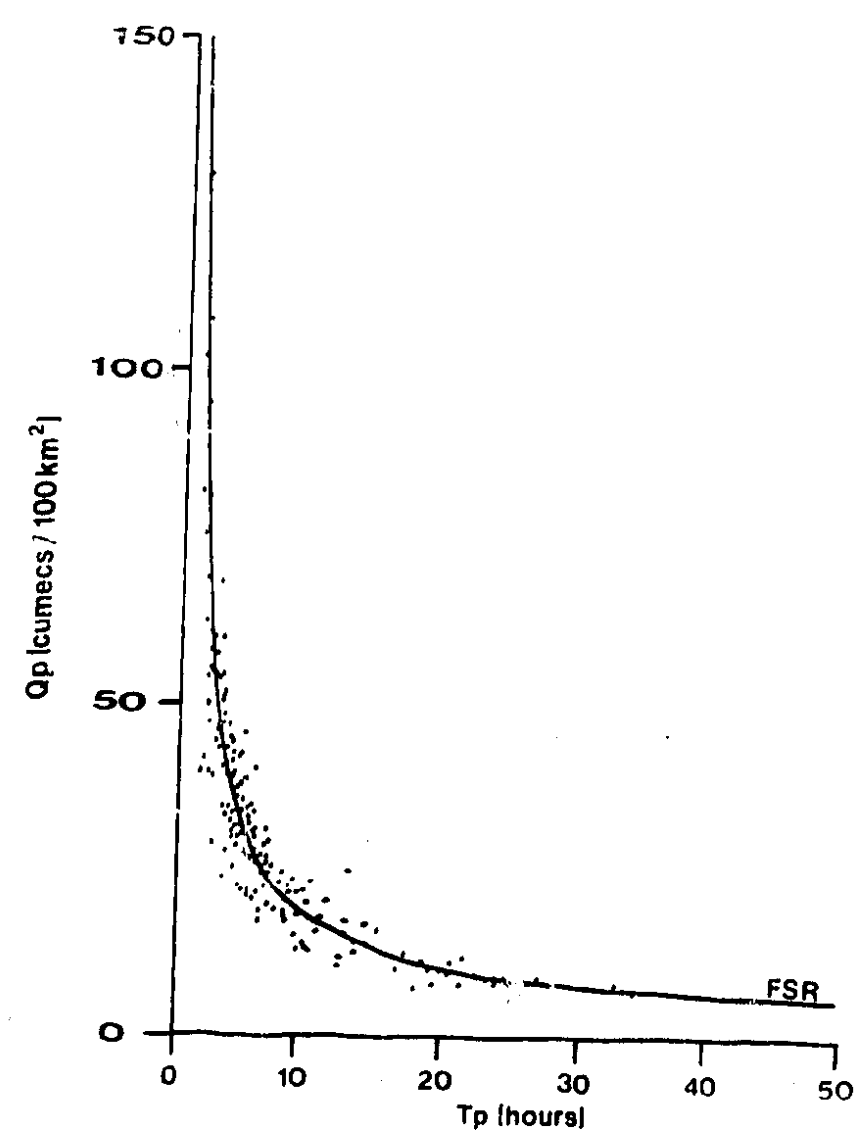


FIGURE 3.2

Catchment average values of Qp plotted against Tp

TABLE 3.1 REGRESSION OF SECONDARY UNIT HYDROGRAPH PARAMETERS

	Estimate	se	t	R^2	see	observations
Dependent variable : QpTp						
Independent variable						
Catchment averages						
Tp	2.809	0.392	7.17	0.229	347	175
Constant	157.1	4.130	38.03	-	-	-
FSR						
Tp	2.587	0.407	6.35	0.241	334	129
Constant	162.2	4.832	33.6	-	-	-
Dependent variable : W/Tp						
Catchment averages						
Tp	- 0.0154	0.00354	4.35	0.10	0.314	175
Constant	1.483	0.0374	38.6	-	-	-
FSR						
Tp	- 0.00834	0.00325	2.57	0.049	0.267	129
Constant	1.399	0.0386	36.2	-	-	-

Headings in this and subsequent tables contain the following abbreviations

se	standard error of the coefficient
t	t statistic
R^2	coefficient of determination
see	standard error of the estimate
sfe	standard factorial error of the estimate.
RMS	root mean square

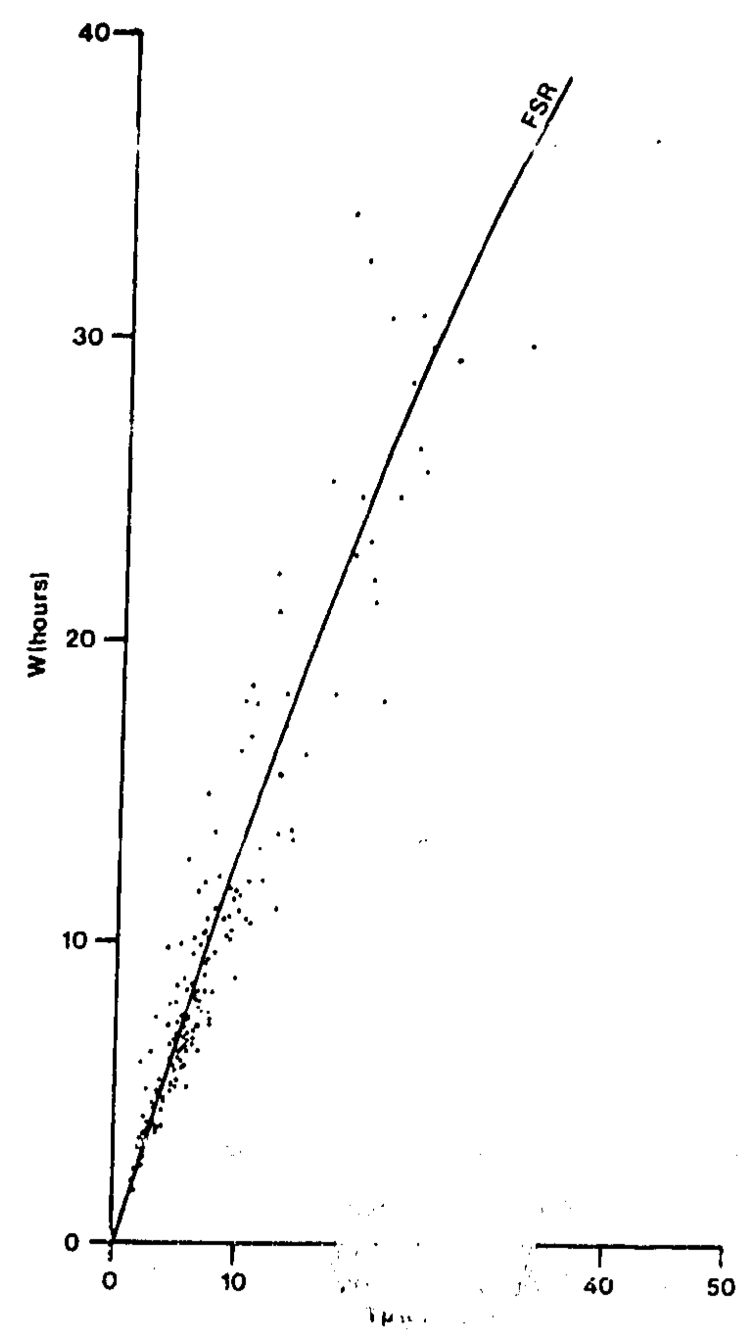


FIGURE 3.3

Catchment average values of W plotted against Tp

The interaction between unit hydrograph shape and loss model is such that an adjustment must be applied to allow for the change in rainfall separation technique. FSR I,6.5.9 details the effect this may have. The simplifying assumption of using a triangular unit hydrograph and modifying the QpTp relationship given in FSR I,6.5.2 is still considered valid as the original equations relating internal parameters are given support by the new data set.

In the FSR, Tp is estimated from a regression equation that has streamslope, urban fraction, mainstream length and RSMD as the independent variables. The meanings of the first three of these are obvious, although it is important that they are abstracted in the prescribed manner (FSR I,4.2). RSMD is an effective 5 year return period 1 day rainfall that is laborious to calculate and easy to mis-calculate. Since it is highly correlated with SAAR, the standard period average annual rainfall, which is much easier to derive, it was decided to replace RSMD with SAAR if this could be achieved without loss of accuracy in estimation.

The use of Tp, the 1-hour unit hydrograph time to peak, can also cause problems in application of the estimation equation on fast responding catchments. In such cases the required data interval may be a half or quarter hour and the 1-hour Tp must be adjusted. As the lower bound of estimated Tp's is zero it is clearly possible for adjusted Tp's to be negative, although it is more likely that they will just be unreasonably small. This problem can be avoided by developing a regression equation for time to peak of the instantaneous unit hydrograph. Whereas the 1-hour unit hydrograph represents the response to 10 mm of rainfall occurring in one hour, the instantaneous unit hydrograph is the response of an equal, but instantaneous, rainfall at the start of the hour. The time to peak of the instantaneous unit hydrograph Tp(o) can be estimated from the 1-hour time to peak, Tp(1), by Tp(1) - 1/2.

Table 3.2 gives details of regression equations derived from the new data set and incorporating these amendments. While the equations based on the new data set and using Tp(1)-1/2 as the independent variable appear inferior to the original FSR equation the change in independent variable makes the comparison almost meaningless. In terms of estimating Tp(1) then the RMS errors from using equation 1 and equation 3 (in Table 3.2) are 4.03 and 4.00 respectively; the equations perform equally well. Replacing RSMD by SAAR has not led to any loss in accuracy in estimating Tp. Equation 4 in Table 3.2 gives details of a regression identical in form to Equation 3 only on a restricted data set; only catchments averages coming from at least five events were included. This considerably reduces the number of observations and the fit of the equation is slightly better than before. The coefficients differ by less than one standard deviation between regression equations. If catchments with more than 5% urbanisation are excluded from the data set then the resulting three variable equation has coefficients very similar to those shown in Table 3.2.

It has therefore been possible to incorporate the desired changes in the Tp estimation equation without any loss in accuracy; the recommendation is that Tp(T), where T is the required data interval, should be estimated from

$$Tp(o) = 283.0 \quad S1085^{-0.33} \, (1+URBAN)^{-2.16} SAAR^{-0.54} \, MSL^{0.23} \qquad 3.1$$

$$Tp(T) = Tp(o) + T/2 \qquad 3.2$$

Figure 3.4 shows observed catchment average values of Tp(1) plotted against values estimated from the above equations.

For situations where stage data are available, but no rating exists to

TABLE 3.2 REGRESSION OF Tp ON CATCHMENT CHARACTERISTICS

Dependent variable : log(Tp(1))

Independent variable	Estimate	se	t	R^2	see	sfe	observations
1. FSR							
Log(S1085)	- 0.381	0.066	..77	0.780	0.150	1.41	130
Log(1+URBAN)	- 1.995	0.284	7.02	-	-	-	-
Log(RSMD)	- 0.417	0.118	3.52	-	-	-	-
Log(MSL)	0.139	0.050	2.77	-	-	-	-
Constant	1.669	0.140	11.91	-	-	-	-

Note: MSL forced into this four-variable equation.

Dependent variable : log(Tp(1)-1/2)

Independent variable	Estimate	se	t	R^2	see	sfe	observations
2. Catchment averages							
Log(S1085)	- 0.288	0.063	4.59	0.742	0.17	1.48	175
Log(1+URBAN)	- 2.152	0.298	7.20	-	-	-	-
Log(RSMD)	- 0.653	0.128	5.09	-	-	-	-
Log(MSL)	0.249	0.047	5.25	-	-	-	-
Constant	1.804	0.159	11.33	-	-	-	-
3. Catchment averages							
Log(S1085)	- 0.327	0.0597	5.47	0.736	0.17	1.48	175
Log(1+URBAN)	- 2.164	0.303	7.15	-	-	-	-
Log(SAAR)	- 0.538	0.115	4.69	-	-	-	-
Log(MSL)	0.228	0.0465	4.89	-	-	-	-
Constant	2.452	0.299	8.21	-	-	-	-
4. Catchments with at least 5 events							
Log(S1085)	- 0.272	0.062	4.36	0.800	0.15	1.41	123
Log(1+URBAN)	- 2.156	0.0317	6.80	-	-	-	-
Log(SAAR)	- 0.619	0.124	4.99	-	-	-	-
Log(MSL)	0.308	0.053	5.78	-	-	-	-
Constant	2.553	0.318	8.04	-	-	-	-

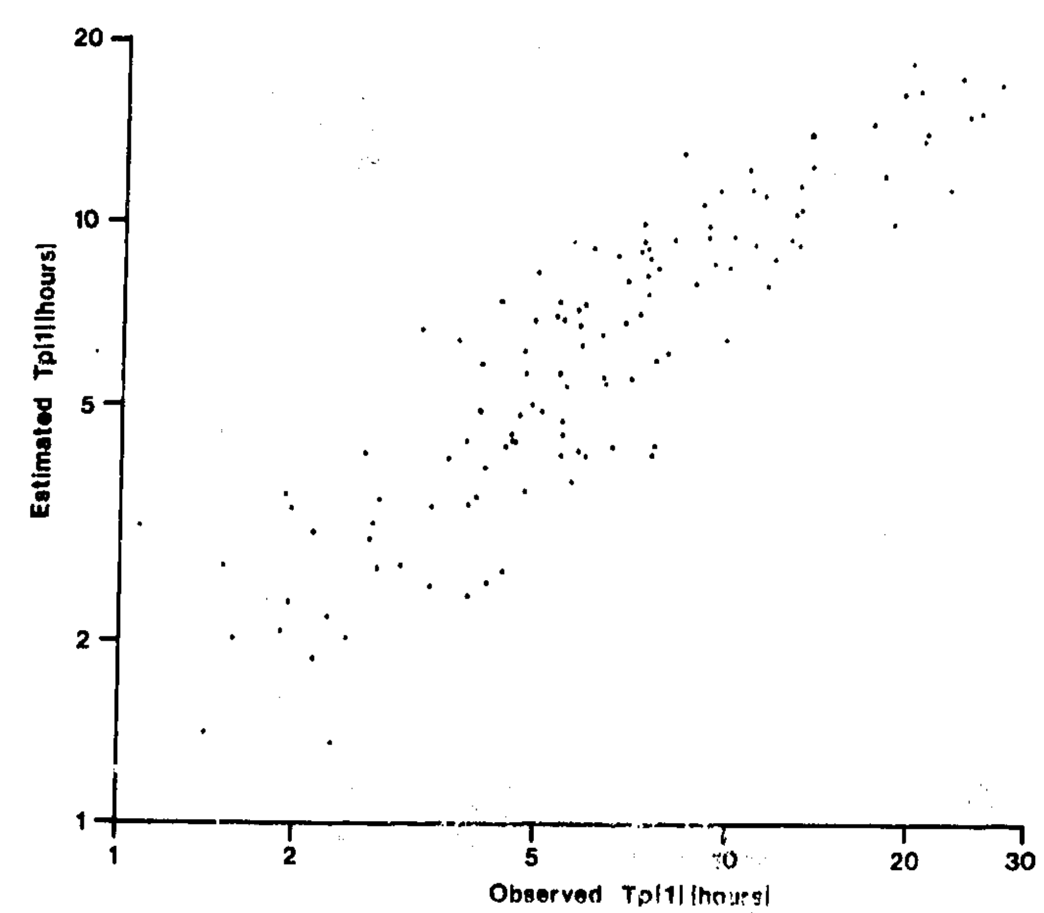


FIGURE 3.4

Estimated against observed (catchment average) values of the 1 hour unit hydrograph time to peak obtain flows, the FSR gives an equation which can be used to estimate Tp from the catchment lag, as defined in FSR I,6.4.2. The equation is

$$Tp(1) = 0.9 \text{ Lag} \quad (3.3)$$

Figure 3.5 shows catchment average values of Lag against Tp for the new data set; also plotted on this figure is the FSR equation, which represents the observed data reasonably well. However, the use of equation 3.3 would be inconsistent with the earlier recommendation to estimate Tp(T) via Tp(o) and could lead to the same problems in estimating time to peaks on quickly responding catchments. Tp(o) may be estimated from the catchment lag using

$$Tp(o) = 0.604 \text{ Lag}^{1.144} \quad (3.4)$$

which has been derived by regression analysis using catchment average data. Table 3.3 gives details of regression analyses on the new data set.

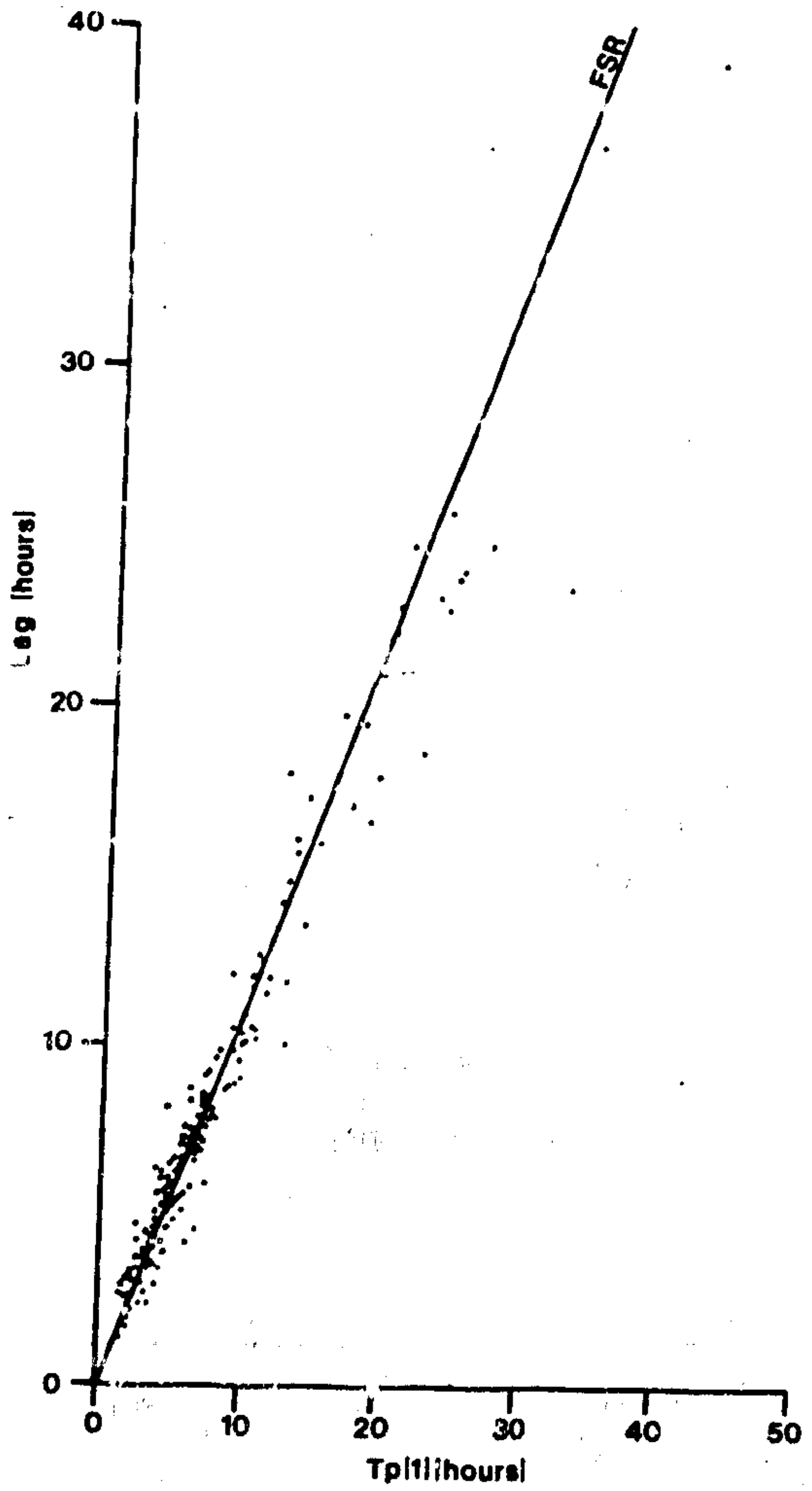


FIGURE 3.5

Catchment average values of Lag plotted against Tp

TABLE 3.3 REGRESSION OF Tp ON LAG

Dependent variable : Log(Tp(1))

Independent variable	Estimate	se	t	R^2	see	sfe	observations
1. FSR							
Log (Lag)	0.99	0.174	57.01	0.962	0.061	1.15	129
Constant	- 0.36			-	-	-	-
2. All catchments							
Log (Lag)	1.041	0.0216	48.14	0.930	0.0790	1.20	175
Constant	- 0.085	0.0194	4.39	-	-	-	-
3. All events							
Log (Lag)	0.973	0.0145	67.05	0.78	0.158	1.44	1264
Contant	- 0.042	0.0127	3.34	-	-	-	-
Dependent variable Log(Tp(1) - 1/2)							
4. All catchments							
Log (Lag)	1.144	0.025	46.41	0.926	0.090	1.23	175
Constant	- 0.219	0.022	9.91	-	-	-	-

4 PERCENTAGE RUNOFF ESTIMATION

In the FSR the estimation of percentage runoff is seen as the most important and yet most uncertain part of the design flood estimation procedure. The usefulness of local data in refining percentage runoff estimates cannot be emphasized too strongly. While the equations presented below are applicable in situations in which no data are available they should be considered as a basis for preliminary flood estimation only.

Variations in percentage runoff can be divided into two components. On a single catchment, percentage runoff will vary with storm characteristics (depth, duration and profile of rainfall) and with catchment state at the onset of rainfall (what stores or deficits of water exist in the catchment eg. soil moisture, surface storage). Thus we expect a larger percentage response from a large storm on a wet catchment than from a small storm on a dry one. When percentage runoffs are compared between catchments then these 'dynamic' variations are superimposed on physical (constant) differences between the basins (soils, geology, land use etc). A catchment located on chalk will give very much lower runoff than one situated on clay. While it is easy to express these intuitive concepts in this general way, in practice it is difficult to define precise relationships supported by real data. This is because of the difficulties in collecting event data that cover the full range of combinations of catchment state, storm variability and catchment type, and in finding suitable indices for these variables. Difficulties may also accrue from a poor choice of rainfall-runoff model or poor model parameterisation but in the present context these are considered relatively unimportant.

The FSR presents an equation that assesses percentage runoff as a standard term, dependent on a soil index and the urban fraction, and a dynamic term that varies with total storm depth (P) and a catchment wetness index (CWI).

$$PR = 95.5\ SOIL + 12URBAN + 0.22(CWI-125) + 0.10(P-10.0) \qquad 4.1$$

standard term — dynamic term

where $CWI = 125 + API - SMD$ 4.2

API is an antecedent precipitation index

SMD is the pre-event soil moisture deficit.

and SOIL is a weighted average of the areas in each of five soil classes on the WRAP map (FSR I,6.5.7)

$$SOIL = 0.15S1+0.30S2+0.40S3+0.45S4+0.50S5 \qquad 4.3$$

This recommendation was updated in FSSR 5, 'Design flood estimation in catchments subject to urbanisation', which split the FSR data into urban and rural subsets. Apart from the urban term the revised percentage runoff equation has the same general structure as the one presented in the FSR:

$$PR_{rural} = 102.4\ SOIL + 0.28(CWI-125) + 0.1(P-10) - 1.9 \qquad 4.4$$

An urban correction can be applied, when required, such that

$$PR = PR_{rural}(1 - 0.3\ URBAN) + 21.0\ URBAN \qquad 4.5$$

In this relationship a distinction is made between those areas mapped as being urbanised that are actually impervious, and the surfaces within the urban areas that are in fact pervious. Equation 4.5 represents urban areas as having a 70% pervious component which responds as the natural part of the catchment and a 30% impervious component which gives a constant 70% runoff. These values come not from the analysis of FSR data but from fully sewered catchment data (Packman, (1977) Kidd and Lowing, (1979)). With this form of urban correction the urban effect is more evident on catchments with low SOIL values whereas a constant addition resulted from the FSR equation. The removal of the urban catchments from the PR regression has led to a larger coefficient for the CWI term (compare equations 4.1 and 4.4). This accords with the expectation that soil moisture deficits are a more important indicator of between event response variation on natural catchments than on those that are urbanised.

As well as having an enhanced data base on which to calibrate a new percentage runoff equation there are other factors that may affect the derived equations. The original WRAP* map as presented with the FSR left some (mainly urban) areas unclassified; these have subsequently been classified. Other relatively minor changes were also made to the WRAP map leading to a revised version of the map being published (FSSR 7). Using the new map and the accurately defined catchment boundaries has led to a set of soil fractions quite different in some cases from those used previously. Since the SOIL index was calibrated on the original FSR data set and because it is the most useful variable in explaining observed differences, it seemed reasonable to review the form of this index as well as the PR equation itself. At a preliminary stage of the analysis for the current review a further modification to the WRAP map was indicated. This is detailed in FSSR 17 and described more fully in Appendix C.

Prior to recalibration of the soil multipliers, percentage runoffs were adjusted for urban effects by inverting equation 4.5 to yield a rural percentage runoff. It was then hoped to determine coefficients for the soil fractions and dynamic terms in a single regression. Unfortunately this proved unreliable because of the limited occurrence of large rainfall events. Omitting the dynamic term dependent on rainfall gave

$$PR_{rural} = 10S1 + 29S2 + 37S3 + 47S4 + 52S5 + 0.25(CWI-125) \qquad 4.6$$

* WRAP = Winter Rain Acceptance Potential

an equation slightly different from, but consistent with, the FSR result. To assess the urban correction a regression based on observed PR's from nearly rural (< 5% urbanisation) was carried out and gave

$$PR = 11S1 + 31S2 + 38S3 + 48S4 + 53S5 + 0.24(CWI-125) \qquad 4.7$$

a result in close agreement with equation 4.6. Regressions similar to equation 4.7 but based on different urban thresholds yielded comparable results. Equations 4.6 and 4.7 are therefore seen as a reasonable basis for a new PR equation. Details of the regressions are in Table 4.1. Convenient values of the coefficients were taken giving

$$PR_{rural} = 10S1 + 30S2 + 37S3 + 47S4 + 53S5 + 0.25(CWI-125) \qquad 4.8$$

Examination of the residuals reveals a significant correlation with the event rainfall which was again fitted by regression analysis (see Table 4.2).

TABLE 4.1 PERCENTAGE RUNOFF REGRESSIONS

Dependent variable : PR_{rural}

Independent variable	Estimate	se	t	R^2	see	observations
1. All events						
SOIL1	10.01	1.46	6.8	0.46	14.9	1851
SOIL2	28.71	1.11	25.8			
SOIL3	36.93	1.31	28.2			
SOIL4	46.62	0.73	64.1			
SOIL5	52.46	0.71	73.6			
(CWI-125)	0.253	0.013	19.9			
Dependent variable : PR						
2. All events from catchments with urban ≤ 5%						
SOIL1	10.77	1.36	5.8	0.37	14.9	1460
SOIL2	31.10	1.22	25.6			
SOIL3	38.24	1.59	24.1			
SOIL4	47.61	0.88	54.3			
SOIL5	52.53	0.73	72.2			
(CWI-125)	0.242	0.02	14.0			

TABLE 4.2 PERCENTAGE RUNOFF RESIDUAL REGRESSIONS

Dependent variable : PR_{rural} residuals

Independent variable	Estimate	se	t	R^2	see	observations
P	0.129	0.016	8.20	0.04	14.6	1851
Constant	- 5.256	0.670	7.84			

The resulting model for PR is represented by the three equations

$$SPR = 10S1 + 30S2 + 37S3 + 47S4 + 53S5 \quad 4.9$$

$$PR_{rural} = SPR + 0.25(CWI-125) + 0.13(P - 40) \quad 4.10$$

$$PR = PR_{rural}\,(1-0.3\ URBAN) + 21.0\ URBAN \quad 4.11$$

These equations represent a slight improvement over the PR formulae given in the FSR and in FSSR 5. The two main differences between the new equations and those presented in the FSR are the reduction in response from type 1 soils and the increase in magnitude of the dynamic terms. The first of these is explained by looking at the catchments located mainly on type 1 soils. Over half of the catchments mainly located on type 1 soils that were analysed in the FSR had significant urban areas (>10% urbanisation) and yet no adjustment was made prior to calibration of the SOIL index; the current analysis does have such a correction and gives a lower natural response. The increase in the dynamic term coefficients is again seen as a product of the urban adjustment and partly perhaps because of the combined fitting of soil and CWI multipliers.

The three equations 4.9 – 4.11 give a percentage runoff estimation method based on the current data set and data from small urban (sewered) catchments. While their accuracy is limited (see. of 15%) they are thought to provide a sound blend of empirical analysis and hydrological theory and could be used with due caution in conditions similar to those used to derive the equations. Restriction on their application is warranted on catchments where there is a large urban fraction and especially where this is concentrated rather than distributed throughout the catchment. The dynamic conditions encountered in the data set cover the full range of values for CWI that are likely to be experienced in even the most extreme design case; the same cannot be said for the event rainfalls of which less than 2% are greater than 100 mm. This introduces reservations over extrapolating equation 4.10 to apply to rainfall totals much greater than 100 mm. Unfortunately this is unavoidable when seeking to estimate probable maximum floods (*PMF's*) for which the design rainfall may be as high as 400 mm. Clearly these relationships derived from common events are not easily extrapolated to extreme situations. In estimating *PMF's* it is necessary to consider the general philosophy behind the estimate which in the case of the FSR was a reasonable maximisation of all contributary factors. The absolute maximum for percentage runoff is 100% so it seems reasonable to limit percentage runoff to this value under the most extreme conditions likely to occur, say a rainfall of 400 mm on a catchment with a CWI of 200 mm and, if possible, to approach this limit asymptotically.

It is therefore recommended that the rainfall term in equation 4.10 be replaced by

$$0 \quad \text{for } P < 40 \text{ mm}$$

and $0.45(P-40)^{0.7}$ for $P > 40$ mm

This adjustment gives close agreement with the fitted equation (4.10) over the rainfall range 30 mm – 110 mm and yields 99.5% runoff from an event of 400 mm occurring on a soil type 5 catchment with CWI of 200 mm. This form of relationship will also alleviate problems of negative percentage runoffs estimated for small events on catchments with mainly type 1 soils. Although this is a most unlikely occurrence in design use it could happen in other applications and indeed should be expected in conditions where the percentage runoff is less than the standard error of estimate of the PR equation. Users who are concerned about the arbitrary nature and dubious conception of this correction should remember that estimates of PR using the regression equation have a standard error of estimate of 15%.

The percentage runoff model can therefore be summarised by the equations

$$PR_{rural} = SPR + DPR_{CWI} + DPR_{RAIN} \quad 4.12$$

where

$$SPR = 10S1 + 30S2 + 37S3 + 47S4 + 53S5 \quad 4.9$$

$$DPR_{CWI} = 0.25\,(CWI-125) \quad 4.13$$

$$DPR_{RAIN} = 0.45(P-40)^{0.7} \quad \text{for } P > 40 \text{ mm} \quad 4.14$$

$$= 0 \quad \text{for } P < 40 \text{ mm}$$

$$PR = PR_{rural}\,(1.0 - 0.3\ URBAN) + 21.0\ URBAN \quad 4.11$$

Figure 4.1 shows catchment average values of percentage runoff estimated using these equations plotted against the observed values.

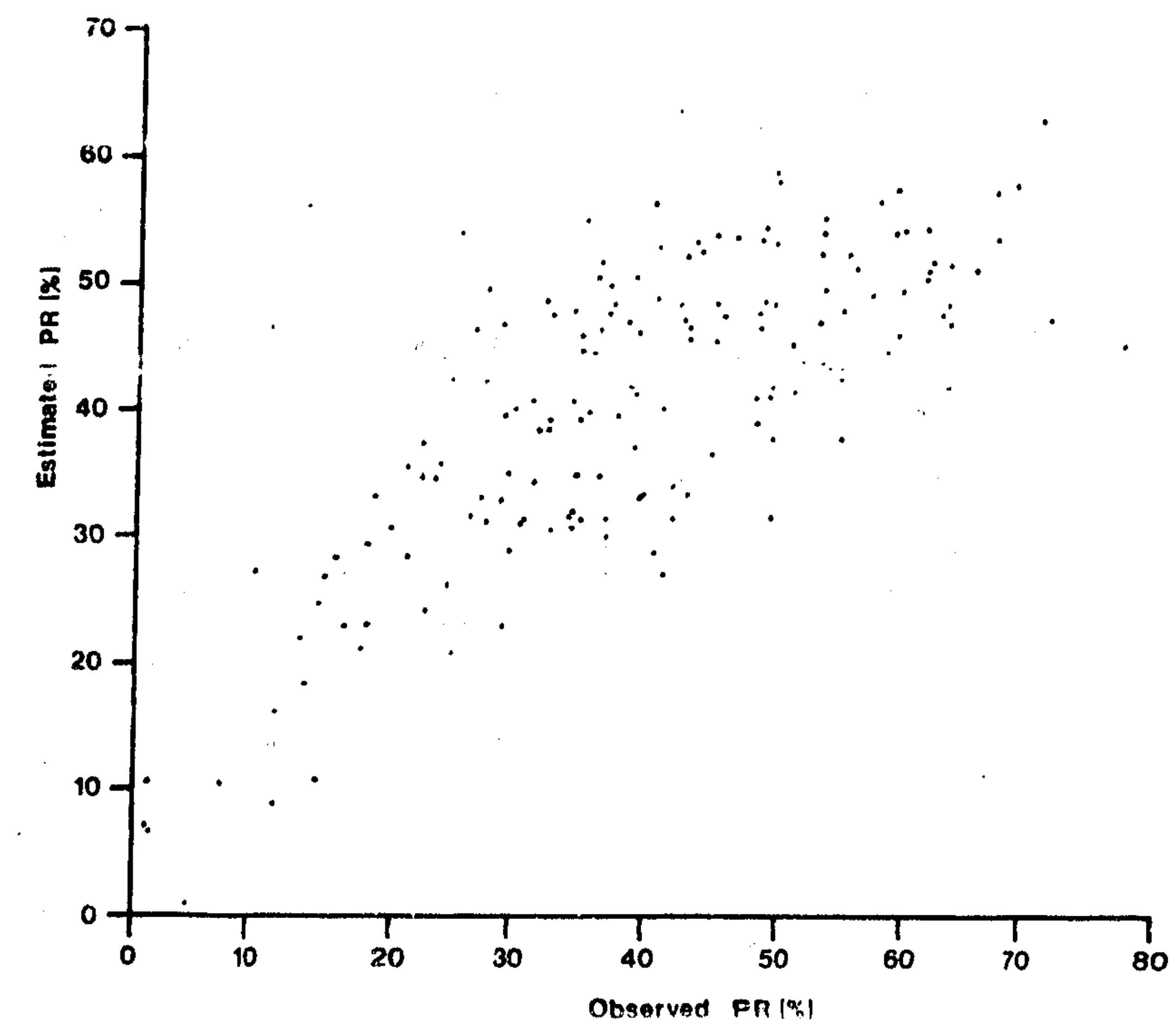


FIGURE 4.1 Catchment average values of estimated PR plotted against observed PR

It is possible to revise the estimates of percentage runoff obtained from the above equations by using data available at the site of interest.

If event data (ie flow and rainfall data at a short time period) are available in sufficient quantity then it may be possible to derive a relationship based on these data alone. More normally though it is only possible to replace the value of SPR obtained from the WRAP map. To do this requires the careful abstraction of the flow hydrograph and corresponding rainfall for at least five big flood events. The hydrograph should be separated as described in FSR I.6.4.3 and the volume of quick response runoff calculated. PR is the ratio of quick response runoff to total rainfall expressed as a percentage. If the catchment contains an urban fraction, adjust PR to give PR_{rural} using equation 4.11 (otherwise PR_{rural} = PR). The dynamic adjustments are given by equations 4.13 and 4.14 and once calculated should be subtracted from PR_{rural} to give SPR. SPR's calculated from several events should be averaged and the resulting value becomes the new estimate of SPR for use in design flood estimation.

Many sites however may just have daily mean flow data; this can be used to refine a SPR estimate by using the base flow index (BFI) derived from these daily flows. The BFI is the ratio of base flow to total flow using a particular form of flow separation (Low Flow Studies, NERC) and is well correlated with SPR. Table 4.3 details a regression analysis which gives the equation

$$SPR = 72.0 - 66.5\ BFI \qquad 4.15$$

TABLE 4.3 SPR – BFI REGRESSIONS

Dependent variable : SPR

Independent variable	Estimate	se	t	R^2	see	observations
1. All catchments						
BFI	- 64.24	4.47	14.36	0.56	9.4	166
Constant	71.03	2.18	32.54	-	-	-
2. All catchments weighted by number of available events						
BFI	- 66.49	4.28	15.55	0.59	8.97	166
Constant	72.05	2.10	34.38	-	-	-

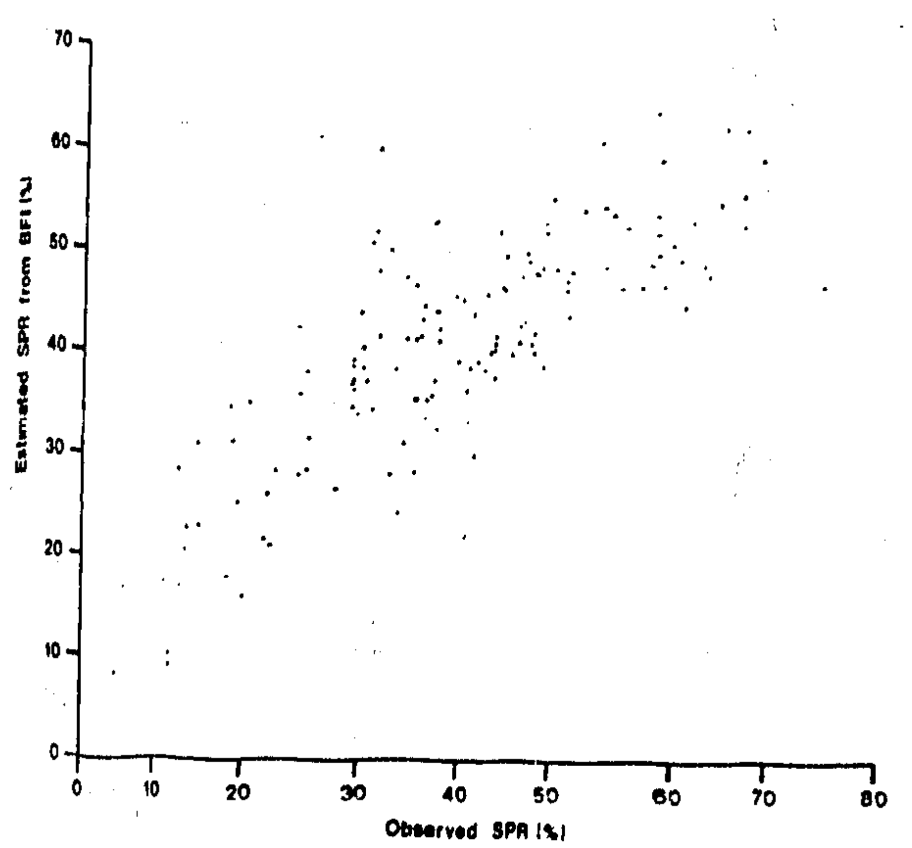


FIGURE 4.2

SPR estimated from BFI plotted against catchment average values calculated from event data

This equation should be used in preference to the soil equation (equation 4.9) as it is based on hydrological data at the site of interest but will yield inferior estimates to those obtained from event analysis. Figure 4.2 shows SPR's estimated using equation 4.15 plotted against observed values.

5 BASE FLOW ESTIMATION

The equations given in the previous two sections allow the response hydrograph to be estimated. The final step in the formulation of the design flood hydrograph is the addition of a certain flow to represent the flow in the river before the event started and to a lesser extent the start of slow response runoff from the event itself. This flow was labelled average non-separated flow (ANSF) by the FSR, a term that serves as a reminder that the hydrograph was separated as an expedient for analysis and does not represent a separation of flow generated by different runoff processes.

Regression analysis yields an equation for ANSF in terms of the variables CWI and SAAR

$$ANSF = (33(CWI-125) + 3.0\ SAAR + 5.5) \times 10^{-5} \qquad 5.1$$

where ANSF is the additional flow in cumecs/km^2 that should be added to each ordinate in the design flood. Details of the equation can be found in Table 5.1.

TABLE 5.1 THE ANSF REGRESSION

Dependent variable : ANSF

Independent variable	Estimate	se	T	R^2	see	observations
CWI	0.000328	0.0000216	15.63	0.420	0.025	1851
SAAR	0.0000298	0.0000011	28.10	-	-	-
Constant	- 0.04059	0.002598	15.20	-	-	-

In the design situation CWI is determined directly from SAAR using Figure FSR I.6.62. ANSF is therefore solely dependent on SAAR and the value obtained from the equation can be checked against the graphed relationship given in Fig. 5.1 which shows ANSF against SAAR.

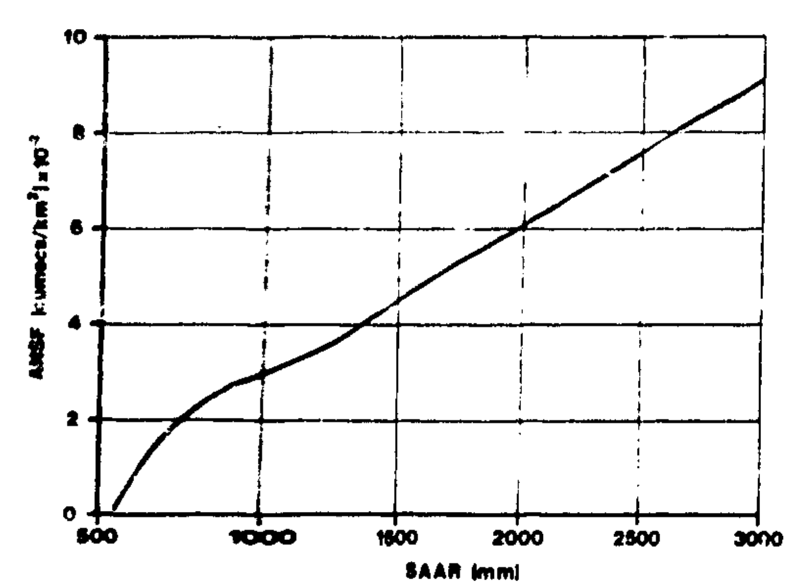


FIGURE 5.1

Graphical representation of ANSF-SAAR relationship for design use

6 ASSESSMENT OF PROCEDURES

Although a comparison of observed and estimated parameter values for catchments used in the regression studies is not a particularly rigorous assessment for the equations given in sections 3, 4 and 5, a list of observed average, maximum and minimum values together with their estimates is contained in Table 6.1. An asterisk in the table indicates that some events on the catchment have been used for volume analysis only.

TABLE 6.1 OBSERVED AND ESTIMATED PARAMETER VALUES

CATCHMENT	PERCENTAGE RUNOFF: OBSERVED MEAN	OBSERVED MAX	OBSERVED MIN	ESTIMATED MEAN (FROM SOIL)	ESTIMATED MEAN (FROM BFI)		TIME TO PEAK (H): OBSERVED MEAN	OBSERVED MAX	OBSERVED MIN	ESTIMATED MEAN
19002	62.70	93.67	66.51	47.45	49.97	*	7.31	9.60	5.10	6.94
19005	57.13	71.72	44.53	49.20	50.01	*	5.13	6.50	4.00	6.89
21001	32.37	40.39	18.39	19.27	31.65	*	8.98	12.00	7.00	9.72
21030	33.51	46.58	26.64	35.30	35.52					
23002	35.78	50.13	20.38	50.45	42.45	*	5.25	6.40	4.00	6.82
23005	53.17	69.07	45.27	52.40	53.59	*	6.60	7.90	5.50	8.65
23006	40.74	40.74	40.74	54.97	52.49					
23010	49.35	55.12	31.37	53.13	54.98					
24003	48.40	60.58	42.19	54.46	50.31					
24005	25.79	44.01	13.36	46.71	37.39	*	7.18	9.80	4.70	8.93
24007	36.19	57.93	23.30	46.32	39.91	*	5.64	8.20	4.00	5.18
25003	[illegible]	89.47	[illegible]	51.56	65.45	*	3.99	5.00	2.90	3.69
25004	[illegible]	40.35	17.02	49.46	39.35	*	10.95	11.50	10.40	14.45
25006	47.13	53.91	40.34	53.59	58.29					
25011	40.77	46.77	45.77	52.77	57.74					
25012	65.39	72.16	59.63	51.22	56.99		2.20	2.65	1.75	3.25
25810	52.90	65.20	43.02	47.05		*	2.18	2.45	1.55	1.31
27001	42.25	64.12	21.70	43.34	38.36	*	9.53	10.20	8.20	13.81
27010	34.18	34.13	34.18	32.38	21.26					
27026	35.35	53.94	21.32	39.80	43.16	*	9.60	13.50	5.70	8.50
27027	53.[illegible]	90.99	29.01	55.16	49.27	*	7.90	10.20	6.50	9.25
27031	42.53	59.60	25.47	41.83	47.34		4.95	5.00	4.90	5.47
27034	61.80	75.09	45.14	51.72	51.07	*	7.70	7.70	7.70	9.10
27035	35.69	51.41	23.30	44.48	38.43	*	7.01	8.20	5.20	8.84
27051	32.70	51.75	19.77	47.46	50.19	*	3.44	3.80	3.10	3.99
28016	27.02	34.67	22.03	17.21	26.9[illegible]	*	21.30	30.00	19.60	14.23
28023	17.60	32.31	9.62	21.10	25.46	*	9.71	12.50	7.90	6.34
28026	48.29	59.05	41.48	46.49	39.06		24.94	30.00	15.40	14.96
28033	25.30	41.33	10.82	53.93	43.21		2.56	2.95	1.85	2.94
28041	45.00	58.14	29.07	53.79	46.92					
28070	40.59	70.39	20.55	48.81	43.71	*	2.65	3.55	1.35	3.43
29004	24.87	36.61	11.63	20.63	34.80	*	8.12	10.20	5.80	12.84
30001	27.50	37.44	17.07	31.14	26.69	*	19.94	24.00	16.00	16.31
30004	20.37	27.12	5.60	35.60	19.40	*	9.34	11.60	7.00	11.13
31005	54.58	90.17	27.66	43.40		*	34.25	42.00	26.50	19.32
31010	38.53	51.09	23.14	41.91	36.08	*	14.10	14.10	14.10	10.64
31021	14.83	22.62	7.04	30.59	26.14					
31023	25.15	25.15	25.15	39.23	53.25		4.30	4.30	4.30	5.07
32801	38.99	66.61	15.98	46.15			4.53	6.35	2.75	6.02
33014	13.64	18.20	7.27	22.11	20.51	*	24.60	25.90	22.40	14.56
33015	34.50	45.50	18.38	39.19	34.05	*	19.31	33.20	13.00	18.13
33029	7.26	11.11	3.11	10.54	5.62	*	10.46	14.80	6.50	12.05
33045	18.25	28.50	3.09	33.34	22.19	*	18.12	22.80	15.20	9.82
33809	54.74	82.07	30.61	37.71	51.33	*	18.45	26.80	13.60	16.09
34003	11.97	16.58	6.17	9.91	15.78	*	13.32	18.50	9.50	13.78
34005	23.66	31.30	18.64	35.90	29.17	*	23.90	25.10	22.60	14.91
34007	39.05	53.23	27.07	33.09	35.90					
34011	12.04	17.09	5.58	16.19	18.08	*	10.80	13.20	9.00	14.66
35008	41.97	65.15	23.66	35.97	43.56	*	11.14	16.20	7.00	10.92
36008	43.01	59.37	21.92	33.36	44.27	*	23.27	31.00	12.60	17.16
37001	45.00	61.86	10.94	36.42	45.97	*	33.13	39.00	26.50	17.56
37003	33.94	52.56	3.04	31.69	34.24					
37007	36.22	48.44	10.00	34.86	44.00	*	13.38	17.00	10.40	12.19
37008	28.61	32.85	24.34	31.89	31.51					

TABLE 6.1 OBSERVED AND ESTIMATED PARAMETER VALUES - Contd

CATCHMENT	PERCENTAGE RUNOFF: OBSERVED MEAN	OBSERVED MAX	OBSERVED MIN	ESTIMATED MEAN (FROM SOIL)	ESTIMATED MEAN (FROM BFI)		TIME TO PEAK (H): OBSERVED MEAN	OBSERVED MAX	OBSERVED MIN	ESTIMATED MEAN
37331	23.92	33.06	12.31	44.12						
38003	1.10	1.53	0.27	7.25	-1.69	*	4.85	4.90	4.80	12.15
38007	37.57	66.23	9.58	30.46	39.97	*	3.67	5.75	2.25	4.28
39004	1.34	2.52	0.75	4.27	11.29	*	1.91	3.25	1.25	2.29
39005	19.34	33.91	12.90	30.73	19.55	*	3.21	5.85	1.95	3.33
39007	23.15	36.56	12.97	34.63	30.83	*	12.60	16.00	10.10	10.20
39017	53.66	80.96	0.32	43.29	59.64	*	9.31	11.30	6.50	8.43
39022	39.45	55.07	25.28	33.39	21.63		20.54	32.20	13.50	13.51
39025	24.50	50.38	7.86	42.57	37.30	*	15.00	17.90	12.10	10.78
39026	34.81	60.62	20.36	44.71	46.64	*	20.34	28.60	14.10	13.51
39036	3.37	3.37	3.37	9.61						
39052	27.46	39.68	6.49	42.18	43.10	*	5.53	8.60	3.90	7.08
[illegible]	[illegible]	[illegible]	[illegible]	47.40	47.11	*	5.76	13.50	5.50	9.34
39813	47.94	65.55	34.26	47.64		*	6.39	8.50	4.70	4.19
39814	38.86	58.01	21.14	41.33		*	1.89	2.35	1.25	2.31
39820	48.55	71.24	32.66	48.69		*	6.55	7.10	6.00	3.61
39830	13.89	19.57	3.73	18.40		*	3.21	4.05	2.35	2.45
39831	14.97	27.25	3.83	10.70		*	1.48	1.90	1.10	2.65
40004	66.15	68.44	63.97	47.79	47.79		19.15	19.20	19.10	12 21
40006	22.43	36.66	7.22	24.39	27.63	*	7.19	8.60	6.40	8.05
40007	45.16	62.75	28.43	43.56	42.54					
40008	36.52	54.98	25.64	31.51	36.96					
40009	43.06	61.01	14.90	46.59	41.18	*	8.77	14.20	5.10	10.57
40010	49.03	70.86	19.92	41.18	52.44	*	16.64	22.90	11.60	14.32
41005	45.59	64.55	25.11	47.45	40.59	*	17.32	21.40	14.10	11.76
41006	59.32	80.93	15.15	45.97	43.76	*	12.85	16.50	10.50	9.05
41007	77.20	93.79	66.41	45.37		*	26.21	34.00	14.50	16.71
41015	1.17	2.75	0.59	10.72	4.80		4.10	5.30	2.70	7.28
41021	53.13	67.43	39.18	43.72	60.05					
41022	49.30	63.57	42.74	37.79	47.78		7.24	12.00	4.00	8.60
41025	55.43	66.19	43.94	44.71	59.63					
41028	49.39	58.76	35.36	48.37	49.04		8.53	11.30	6.30	7.83
41801	34.05	76.64	14.47	40.65		*	3.73	5.60	2.20	2.37
45002	34.56	61.13	8.58	34.90	39.65	*	7.49	8.00	7.00	8.26
45003	41.17	59.15	17.49	27.06	35.14	*	11.65	15.20	9.50	8.57
45804	37.47	61.83	9.34	39.53		*	4.69	6.10	3.00	6.77
45805	21.94	40.32	7.78	34.59		*	5.59	7.10	4.40	6.67
46003	32.32	42.33	17.27	38.31	39.17	*	4.66	6.50	2.90	4.97
46005	59.55	55.36	21.85	54.22	47.62		3.72	5.60	2.50	3.37
46802	[illegible]	76.44	55.17	57.17	51.70	*	2.64	3.15	1.95	2.64
46805	49.42	53.92	44.83	58.00		*	2.08	2.45	1.65	1.87
47007	31.69	57.85	17.54	38.43	39.64	*	5.25	6.20	4.20	4.60
47008	29.54	59.12	5.02	40.08	46.55					
47011	28.99	54.17	10.95	39.48	38.86	*	5.75	7.90	3.90	4.07
48004	34.08	51.12	15.31	47.85	24.72		7.39	9.80	4.00	4.06
48005	10.25	20.00	3.77	27.25	26.00		4.37	8.10	3.00	4.28
[illegible]	37.09	50.66	27.20	48.29	32.32	*	10.24	11.30	9.50	4.06
4900[illegible]	45.07	74.84	16.01	53.47	40.22	*	5.61	7.70	3.30	4.12
51002	15.22	13.85	9.12	26.83	29.96	*	4.56	6.00	3.00	3.52
52004	38.89	50.80	15.57	37.19	36.44	*	6.69	9.00	4.50	7.89
52005	34.80	56.66	14.30	31.28	32.90	*	9.73	11.00	8.20	8.30
52006	34.17	49.69	18.65	31.73	47.97	*	11.36	14.00	8.90	7.77
52010	48.11	70.73	36.74	38.97	41.41	*	10.73	11.40	10.00	9.09
52016	8.30	14.45	1.86	33.92	16.99		4.31	6.50	3.00	4.23
52020	67.40	82.22	59.82	42.38	56.97		3.37	3.70	3.20	4.85
53005	18.00	28.57	3.54	23.14	30.78	*	9.88	16.10	6.70	9.37
53007	28.82	49.07	19.04	32.91	36.26	*	10.58	14.00	9.30	11.20
53008	30.49	58.25	19.51	31.18	36.10					
53009	16.51	24.17	7.49	23.06	32.77	*	7.80	9.50	5.80	5.98
54004	42.68	55.85	17.52	47.07	34.32	*	12.42	15.00	10.30	9.25
54006	20.74	29.15	15.79	28.50	21.23	*	23.97	26.20	21.00	10.03
54010	41.07	44.80	38.61	40.15	37.01	*	21.30	21.30	21.30	17.84
54011	34.22	65.12	12.24	30.76	27.73	*	12.92	16.50	11.00	10.34
54019	40.44	31.65	22.10	28.79	38.59	*	42.75	46.50	40.00	17.93
54020	21.99	28.83	16.64	37.40	25.36					
54022	40.04	57.87	10.51	56.35	56.06	*	2.35	3.95	1.75	2.02
54034	26.47	46.07	6.56	35.44	35.18					
54090	53.76	77.68	13.69	54.11	54.49	*	1.39	2.03	0.88	1.41
55008	49.25	61.70	33.89	58.52	57.04	*	2.18	2.75	1.65	2.19
55012	34.62	59.59	48.27	42.43	49.99		6.12	9.00	4.00	6.43
55021	29.61	56.95	15.84	28.87	24.98	*	22.40	30.50	8.00	11.[illegible]
55022	49.15	58.18	43.08	31.58	43.26	*	12.80	15.00	7.00	11.33
55025	30.63	39.90	24.37	31.32	35.15	*	5.87	6.70	5.10	8.93
55026	49.24	62.43	33.65	41.78	52.11	*	5.80	6.50	5.10	7.06
55034	58.83	72.68	41.65	57.39	57.77	*	1.54	2.13	1.08	2.02
56002	24.02	28.94	18.15	46.05		*	6.00	6.00	6.00	5.34
56003	26.23	40.65	9.83	31.49	34.72	*	3.53	4.20	3.00	6.29
56004	47.99	99.54	16.45	41.06	42.86	*	7.70	9.60	5.40	5.23

TABLE 6.1 OBSERVED AND ESTIMATED PARAMETER VALUES - Contd

CATCHMENT	PERCENTAGE RUNOFF: OBSERVED MEAN	OBSERVED MAX	OBSERVED MIN	ESTIMATED MEAN (FROM SOIL)	ESTIMATED MEAN (FROM EFI)		TIME TO PEAK(H): OBSERVED MEAN	OBSERVED MAX	OBSERVED MIN	ESTIMATED MEAN
56005	34.77	49.80	22.02	45.96	39.85	*	5.25	7.30	4.10	4.04
56006	50.84	73.89	19.16	45.11	47.04	*	4.56	6.00	3.50	5.56
56011	30.25	40.20	23.92	42.79	33.23		6.58	10.50	4.00	4.92
57004	40.56	59.34	25.40	52.92	48.42	*	6.32	9.60	4.60	5.47
57005	46.51	52.32	29.56	53.60	46.80	*	6.13	8.20	4.50	5.45
57006	43.70	68.71	16.44	53.35	51.48	*	2.50	4.60	1.70	4.07
58001	36.87	61.26	20.59	49.87	47.75	*	4.43	6.50	3.30	4.73
58002	36.58	49.35	25.78	57.47	56.77		4.87	7.40	3.40	4.80
58003	36.64	51.77	26.49	29.99	34.28	*	6.81	9.00	3.80	5.44
58006	44.06	62.10	27.61	52.59	48.83	*	3.82	5.20	2.50	3.44
58008	55.82	71.96	34.21	51.17	46.70	*	4.32	5.50	[illegible]	[illegible]
58009	[illegible]	[illegible]	[illegible]	[illegible]	30.69	*	5.32	6.40	4.50	5.25
60002	51.56	55.56	39.09	43.87	47.84	*	6.93	9.00	4.40	8.23
60003	44.51	44.51	44.51	32.97	33.31		14.00	14.00	14.00	8.37
60006	29.19	29.19	29.19	33.70	44.34					
60007	56.29	62.74	49.55	57.77	51.39		3.05	3.50	2.60	5.76
61001	27.13	35.05	12.61	33.07	30.23	*	7.09	9.50	4.30	9.20
61003	41.96	53.64	26.48	31.44	34.54		5.46	6.80	4.00	3.67
62002	59.36	56.37	54.70	42.09	42.32					
64001	54.71	[illegible]	47.51	47.87	54.50	*	4.56	5.35	4.00	6.97
65001	41.84	56.03	30.17	63.64	62.68	*	4.19	6.20	2.40	2.60
65801	59.05	82.76	45.06	60.11			3.73	6.70	2.10	1.69
66002	15.86	19.58	10.47	27.24	36.76	*	4.57	7.40	1.80	4.13
66004	4.35	6.94	2.74	1.16	0.48	*	3.85	5.10	2.60	6.19
66006	41.80	68.28	23.59	32.19	35.43	*	6.73	9.30	4.40	[illegible]
66011	63.40	80.57	[illegible]	[illegible]	[illegible]	*	4.22	5.20	2.70	4.19
67003	63.17	76.05	41.00	41.91	35.51	*	5.28	6.90	4.90	4.38
67005	28.40	30.12	25.51	46.59	44.56	*	5.40	5.50	5.00	6.21
67008	15.00	33.47	10.84	29.42	34.37	*	7.06	9.80	6.00	9.30
68006	45.18	59.37	31.98	45.49	42.36	*	5.63	6.20	4.80	7.07
68010	51.17	51.17	51.17	48.80			4.00	4.00	4.00	4.16
68802	43.05	52.76	24.93	45.59		*	3.07	6.15	1.95	6.54
69008	29.18	58.82	3.67	23.04		*	9.00	10.00	8.00	6.36
69011	32.13	35.04	29.21	46.55			4.75	4.90	4.60	4.56
69012	53.84	64.27	41.22	27.17			4.80	5.30	4.10	6.47
69013	14.83	41.92	5.02	24.60		*	3.50	4.50	[illegible]	[illegible]
69018	52.55	[illegible]	[illegible]	[illegible]						
69019	[illegible]	[illegible]	[illegible]	25.50		*	2.40	2.90	1.70	3.37
69027	31.04	43.30	20.23	40.68		*	7.44	9.00	5.30	5.34
69031	46.55	53.35	33.63	44.05		*	5.19	6.10	4.10	5.54
69034	36.07	69.14	7.13	51.81			1.34	4.13	1.17	2.07
69802	56.47	66.36	46.58	53.79			3.80	4.60	3.00	3.00
70006	29.44	50.54	10.16	35.03			3.86	4.60	2.00	5.73
71003	57.47	82.35	26.72	56.41	51.61	*	2.37	3.75	1.65	2.66
71004	33.21	52.52	21.39	46.96	44.44	*	5.16	6.40	4.40	7.23
71008	38.84	64.91	14.35	50.50			4.74	5.30	3.90	9.15
71802	69.02	80.82	57.29	57.77	59.24	*	7.22	8.60	6.20	7.53
71804	34.95	50.45	19.53	55.03			2.07	2.55	1.75	3.02
72002	61.52	80.22	44.15	51.02	53.00		5.69	7.00	4.40	7.23
72006	61.45	82.48	47.59	54.46		*	5.44	7.90	5.30	8.65
72818	26.52	34.94	18.52	46.39	62.08		6.66	8.80	4.40	6.74
72820	32.10	43.87	6.51	48.61	48.19	*	2.23	4.65	0.95	1.35
73005	36.79	53.12	19.09	47.65	43.21	*	6.19	7.20	4.00	5.34
73007	42.85	57.52	26.60	52.17		*	3.88	4.30	3.60	3.28
73008	31.39	43.58	21.59	34.31	41.55	*	4.80	5.60	4.20	6.33
73803	65.25	77.14	51.22	37.73		*	9.90	9.90	9.90	4.40
73804	71.15	90.45	57.62	62.84		*	7.44	9.60	5.50	4.21
74001	65.56	84.96	43.98	51.14	57.14					
75006	71.84	94.57	54.43	47.17	57.23	*	3.23	3.80	2.90	3.09
75007	51.23	64.41	39.79	41.49	55.16	*	3.93	5.00	2.90	3.86
76005	65.87	65.87	65.87	52.13	46.87					
76008	58.62	64.80	52.45	50.42	54.31		6.25	7.00	5.50	9.81
76011	67.42	83.96	10.93	53.52	62.21	*	2.59	4.75	1.45	3.14
76014	63.21	93.37	32.97	48.43	51.64	*	3.84	5.10	2.90	4.79
76805	53.10	75.11	4.45	53.97	54.82		1.87	4.05	0.85	3.48
77002	55.11	56.52	39.14	52.13	51.54	*	5.40	6.30	4.60	9.19
83002	58.48	58.48	58.43	55.09	65.16					
84002	63.57	72.78	56.71	56.07			2.93	3.40	2.50	2.74
84005	59.47	80.03	33.63	49.36	55.45	*	3.87	4.45	3.25	3.62
84012	61.33	76.66	42.39	50.44	55.70	*	6.08	7.30	5.20	5.38
84022	33.03	44.99	16.15	47.15	43.91	*	3.38	4.35	2.75	7.36

A more meaningful assessment is summarised in Table 6.2 which gives observed and estimated Tp's and PR's on an event basis for the test data set. This table also lists estimated and observed peak flows for each event and a volume ratio expressing the volume of the estimated hydrograph as a percentage of the observed volume over the duration of the estimated response hydrograph. For one event on each catchment the observed and estimated hydrographs are plotted in Figures 6.1(a)-(f).

It is difficult to give a concise and meaningful summary of the results presented in Table 6.2. Of the 42 peaks from events classified as good quality, 16 (38%) are estimated to within 25% and 27 (64%) to within 50%; of these peaks 18 are underestimated and 24 overestimated. These overall figures hide systematic variations that exist on individual catchments which are worth looking at in more detail.

TABLE 6.2 COMPARISON OF OBSERVED AND ESTIMATED FEATURES ON SIX TEST CATCHMENTS

All estimates are based solely on catchment characteristics

Event	Unit hydrograph, Tp Obs	Est	% runoff Obs	Est	Peak flow Obs	Est	% vol
19001							
7	7.8	7.99	56.5	50.34	149.4	152.2	102.7
8	6.0		45.3	48.92	106.3	108.7	117.0
9	7.1		54.8	49.98	113.9	76.1	103.6
10	5.6		51.7	52.59	130.3	146.8	103.4
11	8.9		58.7	48.98	169.8	145.8	100.8
29001							
2	5.6	11.56	2.7	17.28	1.25	7.23	676.5
4	11.6		2.5	4.75	1.47	2.91	183.0
5	5.7		3.3	18.32	2.51	12.61	507.4
6	5.1		1.7	14.90	0.81	6.77	914.8
7	12.0		2.4	17.50	1.13	6.78	605.7
8	-		1.0	3.76	1.09	3.69	296.6
9	5.0		3.3	21.40	3.70	20.53	484.1
10	5.2		1.9	11.59	3.96	12.54	610.8
11	-		1.8	0.23	1.28	0.15	11.0
39012							
1	3.0	4.62	15.7	19.78	15.81	17.91	112.2
3	-		23.4	40.52	14.66	18.60	145.8
4	4.2		14.7	38.07	11.3	23.39	234.9
5	-		8.7	27.01	10.13	19.35	230.5
6	-		11.7	21.86	13.11	17.79	136.8
7	4.0		24.2	39.56	12.23	23.45	168.2
8	3.9		9.7	24.62	11.18	17.80	186.7
9	-		21.5	38.02	14.07	21.25	167.7
10	5.3		20.5	333.27	22.70	52.21	151.3
11	4.5		9.8	12.44	9.5	9.42	117.5
12	-		12.3	22.51	11.98	14.55	150.3
45004							
1	9.7	10.24	34.3	29.18	62.95	53.09	94.3
2	10.3		17.3	19.25	42.02	45.54	135.2
3	12.2		43.4	20.23	60.66	30.90	52.8
4	6.8		42.4	27.96	59.60	49.16	87.8

5	10.4		50.6	20.75	71.61	37.01	56.3
6	10.0		34.9	25.45	44.22	32.82	116.7
7	9.0		39.2	27.76	47.58	35.43	106.4
8	8.0		45.7	29.81	64.65	44.52	80.6
9	-		67.2	32.88	73.00	38.05	63.0
10	5.3		45.8	29.14	71.01	45.44	75.1
11	10.8		42.1	28.34	60.59	41.67	81.3
12	7.0		44.1	30.46	78.35	49.66	75.8
13	-		14.4	3.54	73.34	11.18	23.5
14	-		37.9	20.20	217.91	52.01	61.2
15	-		51.8	33.91	89.32	59.56	72.6
54016							
1	22.5	19.97	25.2	28.58	10.16	15.52	158.4
2	-		25.2	27.51	7.42	13.97	198.6
3	30.5		24.6	16.52	11.32	12.42	84.2
5	23.5		13.6	17.82	6.98	12.93	169.9
8	-		27.8	27.24	10.02	16.42	153.8
9	24.5		19.1	17.91	10.27	16.20	119.1
12	-		23.8	30.28	11.31	19.08	152.9
67010							
1	3.3	3.53	63.7	53.44	11.46	10.65	99.7
2	2.8		46.3	54.83	12.61	16.96	122.6
3	4.4		46.9	53,75	11.87	11.63	123.8
4	3.8		46.1	56.42	11.16	14.44	137.8
5	1.7		45.7	57.77	18.02	17.24	129.6
6	3.8		60.0	58.06	11.74	9.40	106.9
7	2.7		46.8	56.71	13.60	17.47	125.0
8	-		62.6	61.28	12.30	17.34	105.5
[illegible]	2.7		59.5	[illegible]	14.52	15.27	100.4
11	-		58.7	[illegible]	15.01	14.15	120.8
13	-		45.4	[illegible]	10.53	12.87	154.5
14	2.6		64.5	55.83	11.29	11.20	87.0

19001 Almond at Craigie Hall

The model equations have performed remarkably well on this catchment. The event plotted in Figure 6.1(a) illustrates an event where the peak has been estimated very closely although there is an overestimation of runoff volume by 17%, an error partly explained by the shorter duration of the estimated response hydrograph and an overestimate of ANSF.

29001 Waithe Beck at Brigsley

With the exception of just one event all peaks have been grossly overestimated. Observed percentage runoffs are in the range 1.0 to 3.3% yet the catchment located mainly on type 1 soils is assigned a modelled SPR of 19%. Observed values of Tp are from 5.1 to 12.0 hours with the estimated value at the top of this range. Event 2 in Figure 6.1(b) shows the overestimation typical of events on this catchment. In trying to improve the estimate by using all the other events (ie 8 events) as available data an 'observed' value of SPR can

values. A similar procedure could be applied to the estimation of ANSF. Figure 6.1(b) illustrates the estimated hydrographs when these expedients have been adopted.

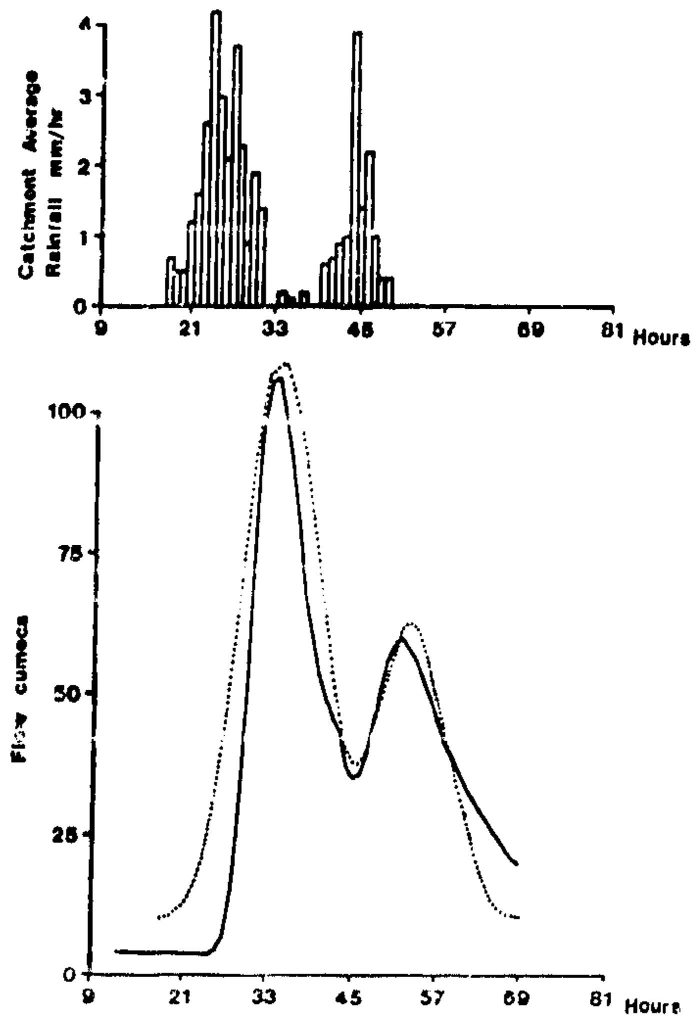


FIGURE 6.1(a)

Observed and estimated hydrographs for catchment 19001 event 8

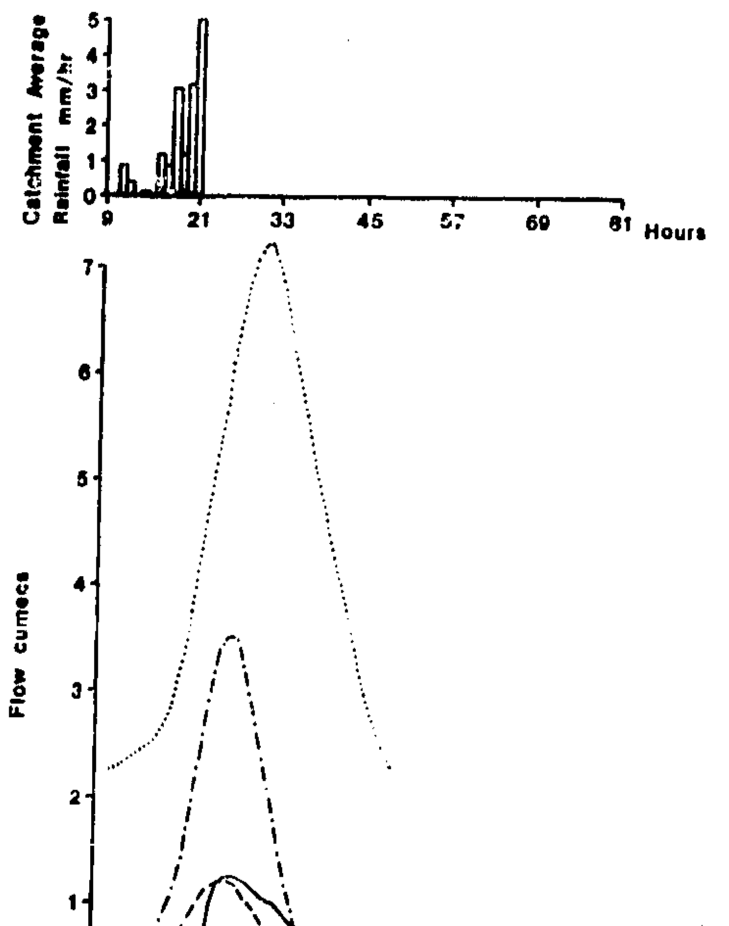


FIGURE 6.1(b)

Observed and estimated hydrographs for catchment 29001 event 2

39012 Hogsmill at Kingston-upon-Thames

On this catchment, with an urban fraction of about 0.5, peak flows are again overestimated. The illustrated event (Figure 6.1(c)) is one of the worst on the catchment. Refining the estimate of SPR using the other event data gives 19%, considerably less than the 34% from the soil map, and in good agreement with the value obtained from using BFI of 17%. The timing of the peak and duration of the response flow are good. Although catchments with a larger urban fraction are included in the calibration data set, the method is not recommended for application in such conditions.

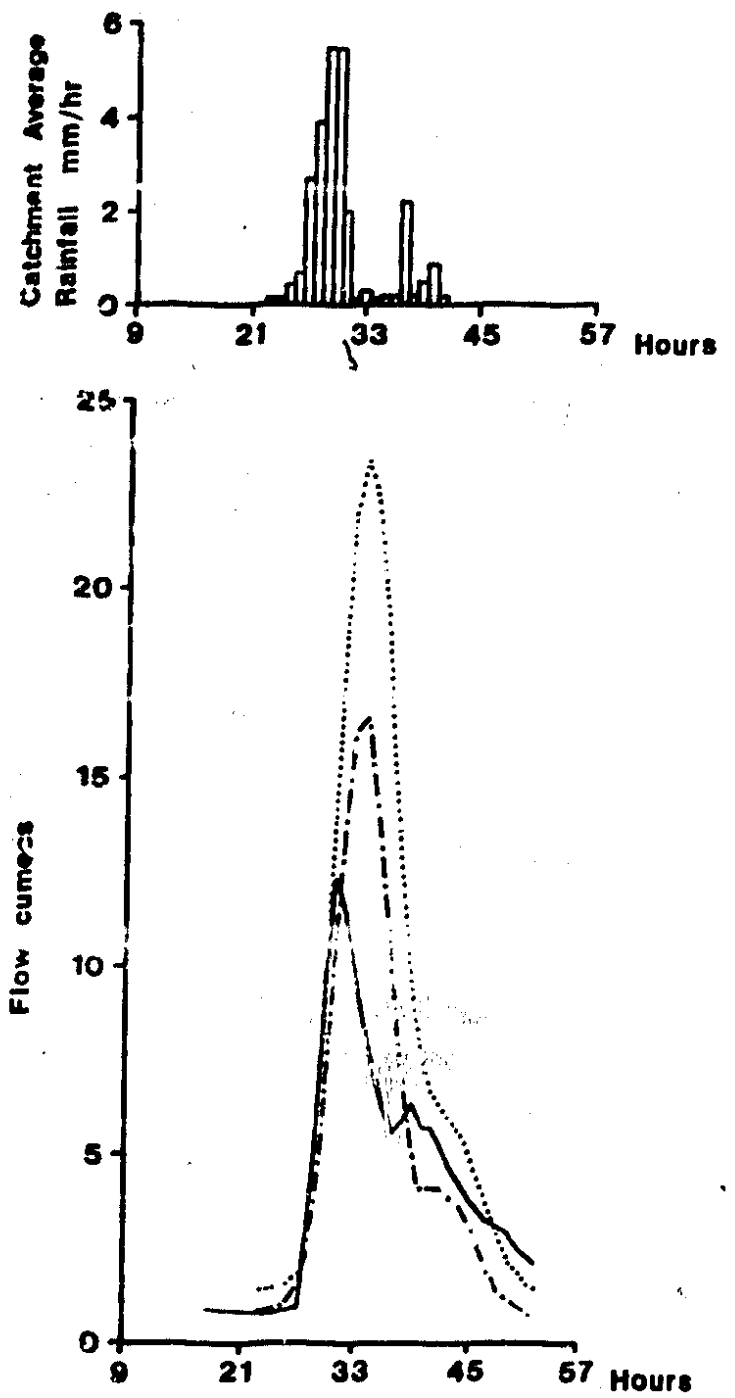


FIGURE 6.1(c)

Observed and estimated hydrographs for catchment 39012 event 7

45004 Axe at Whitford

This is the only catchment in the test data set on which peaks are consistently underestimated, Figure 6.1(d) showing one of the poorer examples. Again, using local data, the SPR from soil of 27% can be replaced by 41% from event data or 39% using BFI and a dramatic improvement in the example event is seen.

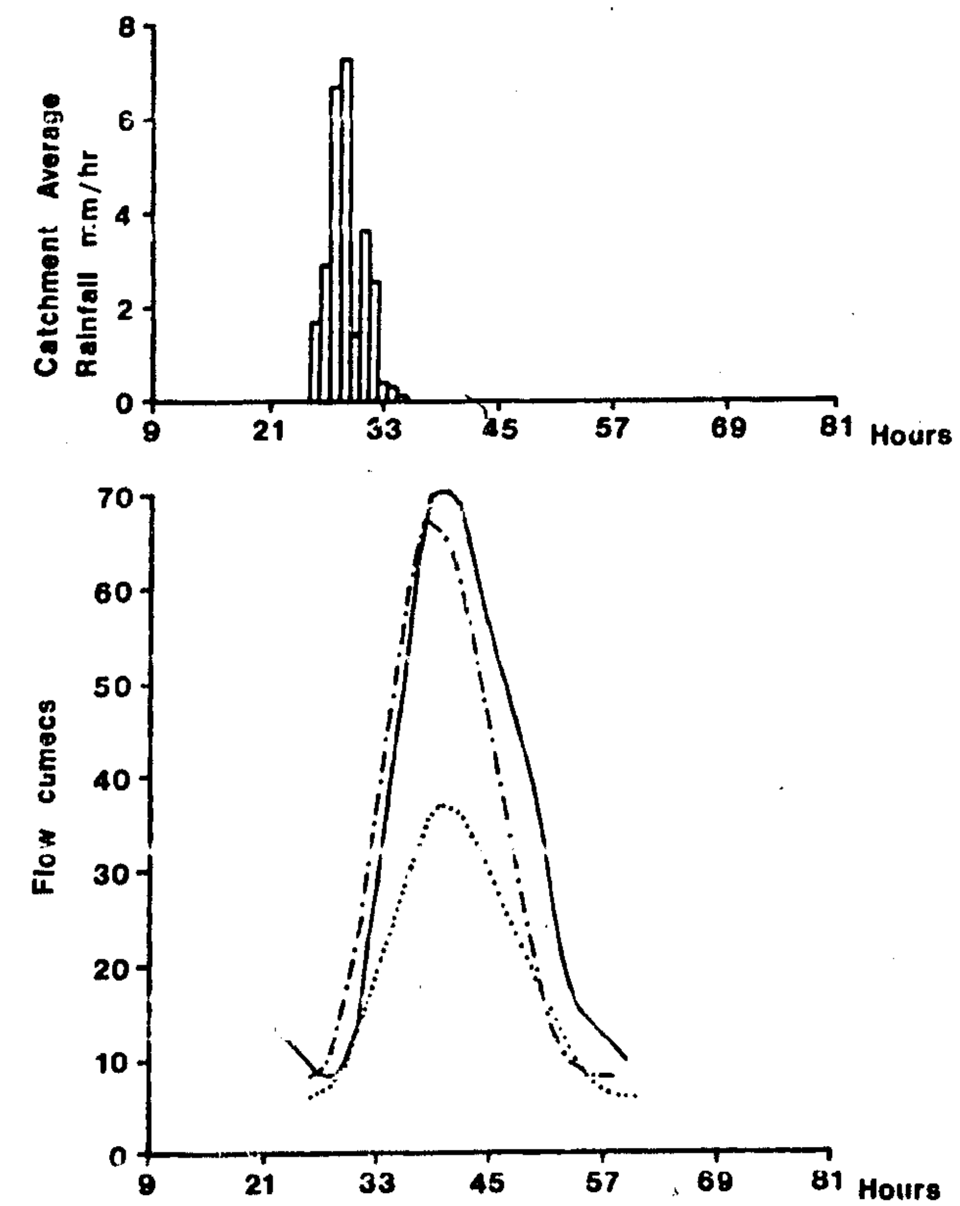


FIGURE 6.1(d)

Observed and estimated hydrographs for catchment 45004 event 5

54016 Roden at Rodington

The event shown in Figure 6.1(e) shows that the problems encountered on this catchment are rather different. Percentage runoff is estimated quite well (SPR 28% from soil, 31% from BFI and 27% using event data) but there is a considerable baseflow error and the response hydrograph shape is rather symmetrical and hence of shorter duration than that observed. With only three other events for which a unit hydrograph was derivable it is not possible in this case to replace the triangular unit hydrograph with one derived from local data. Boorman and Reed (1981) assess methods of deriving an average unit hydrograph suitable for use in this context. The observed ANSF's can be averaged to give a value to replace the one obtained from the equation. The effect this has on event 2 is shown in the figure.

67010 Gelyn at Cynefail

On this catchment the 'no data' equations have performed reasonably well with an equal number of events over and under estimated. In the example of Figure 6.1(f) the response flow is seen to start too early, to be too great early in the event, and to end more quickly than is observed. On this event the constant proportional loss model is not working well although the main peak is estimated reasonably.

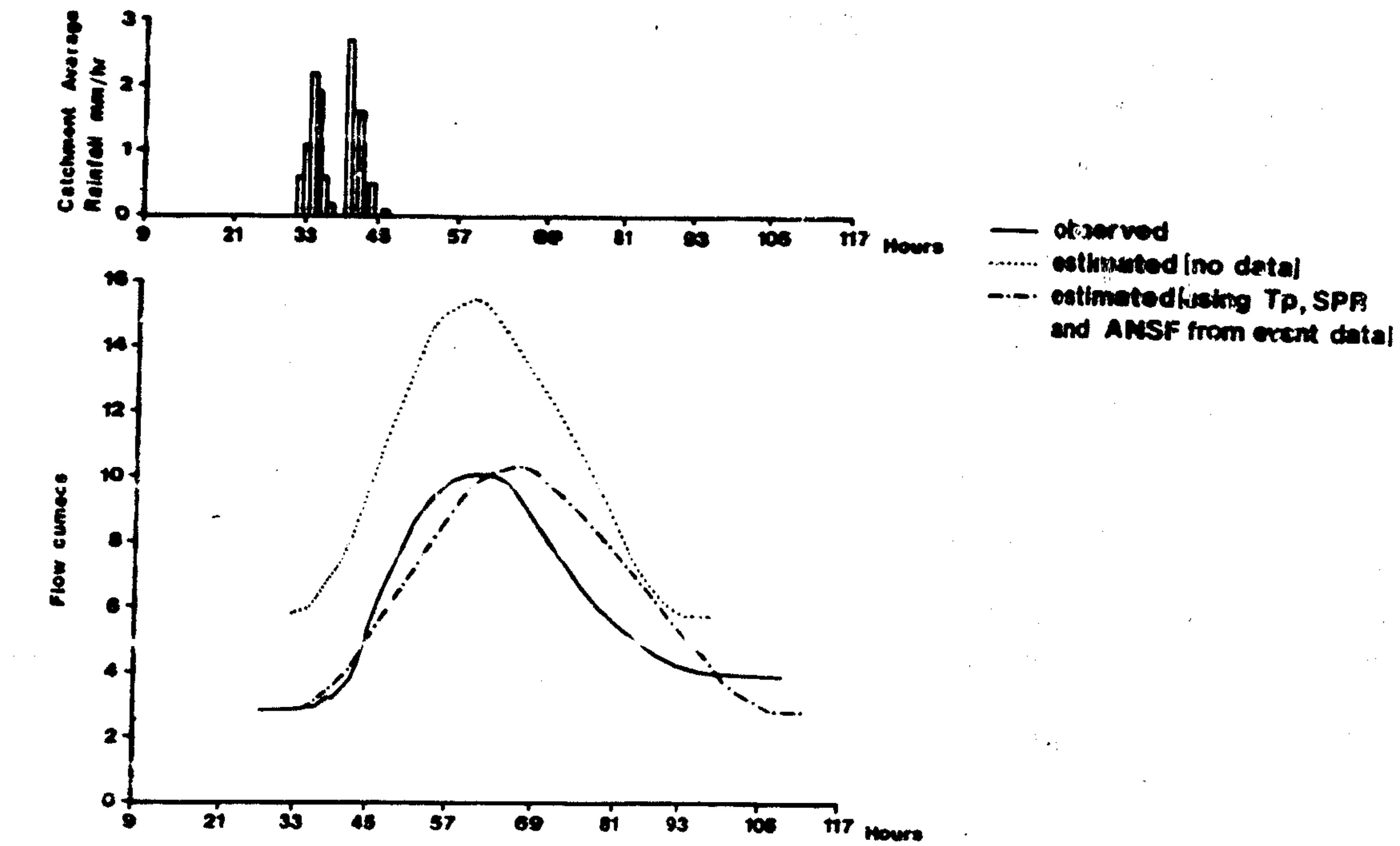
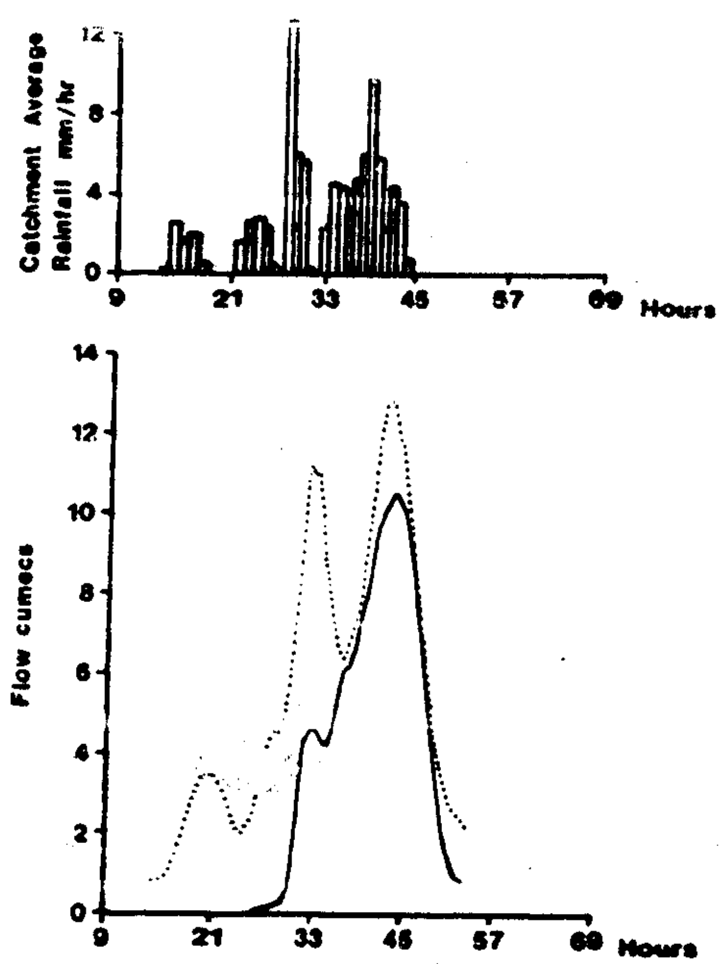


FIGURE 6.1(c) Observed and estimated hydrographs for catchment 54016 event 1

FIGURE 6.1(f)

Observed and estimated hydrographs for catchment 67010 event 13



Summary

The results presented in Table 6.2 represent a severe test of the flood estimation procedure as they are based solely on catchment characteristics. The use of local data to replace regression equation estimates of model parameters has been demonstrated to give a great improvement in the accuracy of the estimations on the six test catchments. A typical application in the United Kingdom will be able to draw on some local data either at the site of interest or from a nearby gauging station. Several types of data can prove beneficial in reducing errors; event data of the type collected for this study are obviously of most use as they can yield both timing and volume of runoff information. Daily mean flows assist in estimating response volumes. The applications given for the test data have revealed many of the problems that may be expected in genuine applications. However, while these problems are revealed in the examples, they will normally remain hidden. The hydrologist or engineer making a flood estimate must remember the uncertainties involved and take steps appropriate to the application to improve the estimate. Applications where errors are likely to be greater include catchments containing significant urbanisation or a large proportion of highly permeable soils.

7 CONCLUSION AND SUMMARY OF RECOMMENDED EQUATIONS

Since the publication of the FSR a considerable amount of new event data has been collected and analysed in line with the procedures of the FSR. The whole data set has been reviewed applying criteria that were more rigorous than those used originally. In addition to the event data review, catchment characteristics were also checked and updated where new maps defining relevant variables had been produced. With the aid of a new computer database system, the Flood Event Data Archive, these data, and key parameters derived from event analyses, are stored in a well organised and easily accessible form. The data set is generally larger than the one available to the Flood Studies team containing many more events from more catchments; it does however have slightly fewer events for which unit hydrographs could be derived.

In the derivation of new model parameter estimation equations consideration has been given to easing problems encountered in characteristic abstraction and application under extreme conditions. The new equations, presented in summary form in the following section, do not represent a major improvement in the standard of flood estimation procedures for ungauged sites. They do however offer a consolidated set of guidelines based on material previously published in a variety of sources (eg FSR, FSSR's). The relatively minor changes that have been introduced are recommended on the basis of an enhanced (and better validated) data set and because of the reviewed choice of dependent and independent variables to assist application. That the FSR parameter estimation equations are not found seriously deficient is a particularly pleasing, and, for all FSR users, a reassuring aspect of this review.

Looking to the future, the most needed enhancement in rainfall-runoff modelling for flood estimation is better definition of runoff volumes. A new soil map containing more classes and at a larger scale is on the horizon and promises the most significant improvement within the framework of the current design package.

SUMMARY OF RECOMMENDED MODEL PARAMETER ESTIMATION EQUATIONS

Summary of Recommended Model Parameter Estimation Equations

Unit Hydrograph Parameters

$$Tp(0) = 283\ S1085^{-0.33}\ (1+URBAN)^{-2.2}\ SAAR^{-0.54}\ MSL^{0.23} \quad \text{(hours)}$$

$$Tp(T) = Tp(0) + T/2 \quad \text{(hours)}$$

$$Qp = 220/Tp \quad \text{(cumecs per 100 sq km)}$$

Percentage Runoff

$$PR_{rural} = SPR + DPR_{CWI} + DPR_{RAIN} \ (\%)$$

where

$$SPR = 10S1 + 30S2 + 37S3 + 47S4 + 53S5 \quad (\%)$$

$$DPR_{CWI} = 0.25\ (CWI-125) \quad (\%)$$

$$DPR_{RAIN} = 0.45\ (P-40)^{0.7} \quad (\%) \quad \text{for } P > 40 \text{ mm}$$
$$= 0 \quad \text{for } P < 40 \text{ mm}$$

$$PR = PR_{rural}\ (1.0 - 0.3\ URBAN) + 21.0\ URBAN\ (\%)$$

If mean daily flow data available to calculate BFI

$$SPR = 72.0 - 66.5\ BFI \quad (\%)$$

Base Flow

$$ANSF = (33(CWI - 125) + 3.0\ SAAR + 5.5) \times 10^{-5} \quad \text{(cumecs/sq km)}$$

Acknowledgement

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The collection, analysis and validation of the data were carried out by a great many members, both past and present, of the catchment response group of the Applied Hydrology section of the Institute of Hydrology. Dr M J Lowing and Dr D W Reed have provided invaluable assistance in the interpretation of analyses and preparation of the report.

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APPENDIX A

CATCHMENT AND EVENT DATA

TABLE A.1 CATCHMENT CHARACTERISTICS FOR BASINS USED IN THE STUDY

NUMBER	NAME	AREA	MSL	S1085	SAAR	SOIL1	SOIL2	SOIL3	SOIL4	SOIL5	URBAN	LAKE	BFI
19001	ALMOND AT CRAIGIE HALL	369.00	42.00	5.81	914	0.	0.	0.	0.80	0.20	0.11	0.04	0.35[illegible]
19002	ALMOND AT ALMOND WEIR	43.50	17.90	5.06	1052	0.	0.	0.	1.00	0.	0.07	0.	0.346
19005	ALMOND AT ALMONDELL	229.00	28.20	6.27	968	0.	0.	0.	0.64	0.36	0.10	0.07	0.343
20001	TYNE AT EAST LINTON	307.00	31.90	6.08	759	0.05	0.	0.22	0.72	0.02	0.02	0.02	0.543
21030	MEGGET AT HENDERLAND	56.20	12.40	15.55	1824	0.	0.	0.51	0.	0.49	0.	0.	0.405
23002	DERWENT AT EDDY'S BRIDGE	118.00	21.40	11.80	932	0.	0.	0.	0.20	0.80	0.	0.	0.424
23005	NORTH TYNE AT TARSET	285.00	36.30	4.85	1255	0.	0.	0.	0.	1.00	0.	0.	0.268
23006	SOUTH TYNE AT FEATHERSTONE	321.90	32.70	10.57	1357	0.	0.	0.	0.	1.00	0.	0.03	0.323
23010	TARSET BURN AT GREENHAUGH	96.00	15.25	16.15	1035	0.	0.	0.	0.	1.00	0.	0.	0.259
24003	WEAR AT STANHOPE	171.90	21.81	14.51	1318	0.	0.	0.	0.02	0.95	0.	0.10	0.350
24005	BROWNEY AT BURN HALL	178.45	31.71	6.39	770	0.	0.	0.	0.99	0.01	0.05	0.	0.515
24007	BROWNEY AT LANCHESTER	44.50	11.90	14.80	768	0.	0.	0.	0.93	0.07	0.	0.	0.466
25003	TROUTBECK AT MOOR HOUSE	11.40	5.07	35.79	2182	0.	0.	0.	0.	1.00	0.	0.	0.152
25004	SKERNE AT SOUTH PARK	250.19	44.20	1.82	671	0.	0.	0.	1.00	0.	0.08	0.	0.533
25006	GRETA AT RUTHERFORD BRIDGE	86.10	17.59	11.68	1179	0.	0.	0.	0.	1.00	0.	0.	0.215
25011	LANGDON BECK AT LANGDON	13.00	5.21	26.64	1621	0.	0.	0.	0.	1.00	0.	0.	0.211
25012	HARWOOD BECK AT HARWOOD	25.10	9.55	[illegible]	1440	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
25810	SIKE WEIR AT MOOR HOUSE	0.04	0.16	43.78	2182	0.	0.	0.	0.	1.00	0.	0.	*
27001	NIDD AT HUNSINGORE WEIR	484.30	84.64	2.56	993	0.01	0.	0.	0.69	0.30	0.02	0.25	0.506
27010	HODGE BECK AT BRANSDALE WEIR	18.90	8.41	34.86	1057	0.	0.	0.	0.40	0.60	0.	0.	0.499
27026	ROTHER AT WHITTINGTON	165.00	15.83	3.93	900	0.03	0.	0.76	0.15	0.06	0.07	0.37	0.454
27027	WHARFE AT ILKLEY	443.00	55.10	4.46	1382	0.	0.	0.	0.13	0.88	0.	0.09	0.378
27031	COLNE AT COLNE BRIDGE	245.00	23.65	9.87	1107	0.	0.46	0.	0.22	0.31	0.11	0.20	0.397
27034	URE AT KILGRAM BRIDGE	510.20	[illegible]	[illegible]	1429	0.	0.03	0.	0.42	0.55	0.01	0.01	0.345
27035	AIRE AT KILDWICK BRIDGE	282.30	[illegible]	[illegible]	1100	0.	0.	0.	0.53	0.47	0.02	0.13	0.426
27051	CRIMPLE BECK AT BURN BRIDGE	3.10	3.75	25.61	331	0.	0.	0.	1.00	0.	0.	0.	0.335
28016	RYTON AT SERLBY PARK	237.11	35.60	2.47	631	0.84	0.	0.	0.16	0.	0.04	0.	0.692
28023	WYE AT ASHFORD	154.00	26.41	10.04	1200	0.80	0.	0.	0.	0.20	0.02	0.	0.735
28026	ANKER AT POLESWORTH	368.00	34.10	7.36	697	0.	0.	0.02	0.98	0.	0.07	0.	0.495
28033	DOVE AT HOLLINSCLOUGH	8.05	3.90	33.37	1392	0.	0.	0.	0.	1.00	0.	0.	0.447
28041	HAMPS AT WATERHOUSES	35.13	14.42	11.31	1064	0.	0.	0.	0.	1.00	0.	0.	0.399
28070	BURBAGE BROOK AT BURBAGE	9.10	4.24	35.45	965	0.	0.10	0.	0.	0.90	0.	0.	0.397
29001	WAITHE BECK AT BRIGSLEY	108.30	20.17	3.33	698	0.81	0.	0.01	0.19	0.	0.	0.	0.864
29004	ANCHOLME AT BISHOPSBRIDGE	54.65	12.11	1.98	630	0.51	0.08	0.	0.42	0.	0.	0.	0.460
30001	WITHAM AT CLAYPOLE MILL	298.00	46.92	2.13	625	0.41	0.04	0.	0.55	0.	0.02	0.	0.650
30004	PARTNEY LYMN AT PARTNEY MILL	61.64	15.14	3.26	673	0.	0.	1.00	0.	0.	0.	0.	0.770
31005	WELLAND AT TIXOVER	417.00	55.36	1.44	643	0.02	0.	0.	0.98	0.	0.01	0.15	*
31010	CHATER AT FOSTERS BRIDGE	68.90	21.46	5.20	641	0.06	0.	0.	0.94	0.	0.	0.02	0.497
31021	WELLAND AT ASHLEY	250.70	28.98	2.50	653	0.	0.	0.	1.00	0.	0.02	0.04	0.443
31023	WEST GLEN AT EASTON WOOD	4.40	2.80	14.60	527	0.	0.	0.	1.00	0.	0.	0.	0.165
32801	FLORE EXPERIMENTAL STATION	6.51	3.28	5.59	654	0.	0.	0.	1.00	0.	0.	0.	*
33014	LARK AT TEMPLE WEIR	272.00	29.87	2.74	622	0.55	0.	0.45	0.	0.	0.02	0.	0.771
33015	OUZEL AT WILLEN WEIR	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
33029	STRINGSIDE AT WHITE BRIDGE	99.80	7.04	1.63	637	0.75	0.25	0.	0.	0.	0.	0.	0.931
33045	WHITTLE AT QUIDENHAM	28.30	7.32	3.26	648	0.	0.	1.00	0.	0.	0.	0.	0.694
33809	BURY BROOK AT BURY WEIR	65.30	19.00	1.65	554	0.	0.	0.85	0.15	0.	0.	0.	0.299
34003	BURE AT INGWORTH	165.00	22.36	2.05	699	1.00	0.	0.	0.	0.	0.	0.03	0.929
34005	TUD AT COSTESSEY PARK	73.30	22.70	1.73	680	0.08	0.	0.92	0.	0.	0.	0.	0.660
34007	DOVE AT OAKLEY PARK	134.00	16.53	1.48	600	0.	0.	1.00	0.	0.	0.	0.	0.494
34019	WENSUM AT FAKENHAM	127.10	17.69	1.32	706	0.80	0.	0.20	0.	0.	0.01	0.	0.821
35006	GIPPING AT STOWMARKET	129.00	14.61	3.41	518	0.	0.10	0.90	0.	0.	0.02	0.	0.359
36008	STOUR AT WEST MILL	224.00	37.90	1.71	617	0.	0.07	0.93	0.	0.	0.01	0.	0.370
37001	RODING AT REDBRIDGE	303.00	62.60	1.22	635	0.	0.	0.80	0.20	0.	0.10	0.	0.359
37003	TER AT CRABBS BRIDGE	77.80	24.83	2.40	587	0.	0.36	0.64	0.	0.	0.	0.	0.526
37007	WID AT WRITTLE	136.00	26.90	1.85	620	0.	0.03	0.90	0.07	0.	0.13	0.	0.386
37008	CHELMER AT SPRINGFIELD	190.30	43.53	1.36	596	0.	0.10	0.90	0.	0.	0.03	0.	0.542
37031	CROUCH AT WICKFORD	71.80	12.40	2.50	571	0.	0.	0.10	0.90	0.	0.25	0.	*
38003	MIMRAM AT PANSHANGER	133.90	17.30	2.59	665	0.60	0.40	0.	0.	0.	0.01	0.	0.944
38007	CANONS BROOK AT ELIZABETH WAY HARLOW	21.37	5.60	7.47	640	0.	0.30	0.70	0.	0.	0.29	0.	0.412
39004	WANDLE AT BEDDINGTON PARK	122.00	[illegible]	4.36	800	0.90	0.10	0.	0.	0.	0.39	0.	0.737
39005	BEVERLEY BROOK AT WIMBLEDON COMMON	43.50	7.40	2.29	440	0.05	0.70	0.	0.25	0.	0.31	0.	0.623
39007	BLACKWATER AT SWALLOWFIELD	354.80	32.34	0.95	719	0.25	0.14	0.35	0.26	0.	0.33	0.	0.633
39012	HOGSMILL AT KINGSTON UPON THAMES	69.10	11.47	3.73	691	0.25	[illegible]	0.01	0.55	0.	0.46	0.	0.719
39017	RAY AT GRENDON UNDERWOOD	18.60	[illegible]	[illegible]	660	0.	0.	[illegible]	1.00	0.	0.	0.	0.130
39022	LODDON AT SHEEPBRIDGE	[illegible]	32.07	1.62	728	0.35	0.	[illegible]	0.65	0.	0.02	0.	0.744
39025	ENBORNE AT BRIMPTON	147.60	[illegible]	[illegible]	834	[illegible]	[illegible]	0.	0.85	0.	0.01	0.	0.512
39026	CHERWELL AT BANBURY	[illegible]	[illegible]	2.15	826	0.06	0.	0.	0.94	0.	0.02	0.09	0.392
39036	LAW BROOK AT ALBURY	16.20	7.66	12.45	850	1.00	0.	0.	0.	0.	0.	0.06	
39052	THE CUTT AT PITTS WEIR, BINFIELD	50.20	11.01	3.51	697	0.	0.	0.20	0.80	0.	0.18	0.	0.403
39053	MOLE AT HORLEY	89.90	14.64	2.75	825	0.	0.	0.	1.00	0.	0.09	0.19	0.419
39813	MOLE AT IFIELD WEIR	12.69	6.06	7.43	839	0.	0.	0.	1.00	0.	0.18	0.28	*
39814	CRAWTERS BROOK AT HAZELWICK	4.50	3.46	3.96	825	0.	0.	0.	1.00	0.	0.77	0.	*
39820	DOLLIS BROOK AT HENDON LANE BRIDGE	25.10	10.80	4.48	688	0.	0.	0.	1.00	0.	0.60	0.	*
39830	BECK AT RECTORY ROAD	10.00	5.30	10.11	665	0.77	0.	0.	0.23	0.	0.64	0.	*
39831	CHAFFINCH BROOK AT BECKENHAM	[illegible]	[illegible]	[illegible]	663	0.65	0.	0.	0.15	0.	0.41	0.	*
40004	ROTHER AT UDIAM	205.70	28.10	2.39	851	0.	0.	0.02	0.98	0.	0.01	0.05	0.380
40006	BOURNE AT HADLOW	50.30	13.51	5.20	724	0.53	0.06	0.	0.38	0.	0.03	0.	0.656
40007	MEDWAY AT CHAFFORD	255.10	25.94	2.47	874	0.	0.	0.02	0.98	0.	0.02	0.19	0.471
40008	GREAT STOUR AT WYE	230.00	29.80	1.91	749	0.32	0.30	0.	0.38	0.	0.03	0.05	0.545
40009	TEISE AT STONE BRIDGE	136.20	19.40	3.24	797	0.	0.	0.	1.00	0.	0.01	0.02	0.459
40010	EDEN AT PENSHURST	224.29	30.92	1.58	775	0.14	0.	0.11	0.75	0.	0.03	0.04	0.304
41005	OUSE AT GOLDBRIDGE	180.90	26.70	2.10	859	0.	0.	0.	1.00	0.	0.04	0.12	0.432
41006	UCK AT ISFIELD	87.80	16.35	3.99	850	0.	0.	0.	1.00	0.	0.02	0.	0.411
41007	ARUN AT PARK MOUND	403.30	44.77	1.50	755	0.04	0.	0.	0.96	0.	0.01	0.06	*
41015	EMS AT WESTBOURNE	52.30	7.27	4.69	907	0.54	0.10	0.	0.06	0.	0.	0.05	0.959
41021	CLAYHILL STREAM AT OLD SHIP	7.12	5.70	3.53	840	0.	0.	0.29	0.71	0.	0.	0.	0.174
41022	LOD AT HALFWAY BRIDGE	51.98	16.50	4.90	865	0.24	0.	0.	0.76	0.	0.01	0.	0.360
41025	LOXWOOD STREAM AT DRUNGEWICK	91.58	25.65	2.75	803	0.06	0.	0.	0.92	0.	0.02	0.	0.199
41028	CHESS STREAM AT CHESS BRIDGE	23.91	9.96	4.88	842	0.	0.	0.	1.00	0.	0.01	0.	0.367
41801	HOLLINGTON ST AT HOLLINGTON	3.52	3.48	10.63	762	0.	0.	0.	1.00	0.	0.40	0.	*
45002	EXE AT STOODLEIGH	422.00	45.10	5.70	1402	0.	0.87	0.	0.02	0.12	0.	0.	0.509
45003	CULM AT WOODMILL	226.10	26.45	4.15	965	0.47	0.02	0.	0.51	0.	0.	0.	0.521

NUMBER	NAME	AREA	MSL	S1085	SAAR	SOIL1	SOIL2	SOIL3	SOIL4	SOIL5	URBAN	LAKE	BFI
45004	AXE AT WHITFORD	288.50	33.60	3.55	1309	0.50	0.	0.15	0.35	0.	0.01	0.	0.492
45804	BARLE AT BRUSHFORD	128.00	35.80	5.90	1655	0.	0.65	0.	0.	0.35	0.	0.	*
45805	EXE AT PIXTON	147.50	33.76	8.30	1467	0.	0.90	0.	0.	0.10	0.	0.	*
46003	DART AT AUSTINS BRIDGE	248.00	35.20	16.50	1921	0.26	0.24	0.	0.	0.50	0.	0.	0.527
46005	EAST DART AT BELLEVER BRIDGE	21.50	11.80	22.60	2103	0.	0.	0.	0.	1.00	0.	0.	0.385
46802	SWINCOMBE AT SWINCOMBE INTAKE	14.20	3.62	26.90	1986	0.	0.	0.	0.	1.00	0.	0.	0.368
46805	BALA BROOK AT BALA RES INTAKE	5.93	2.83	75.90	2146	0.	0.	0.	0.	1.00	0.	0.	*
47007	YEALM AT PUSLINCH	54.90	16.60	17.80	1448	0.14	0.50	0.	0.	0.36	0.	0.	0.531
47009	THRUSHEL AT TINHAY	112.70	18.60	6.81	1259	0.	0.33	0.	0.67	0.	0.	0.	0.363
47011	PLYM AT CARN WOOD	79.20	18.30	19.30	1644	0.10	0.40	0.	0.	0.50	0.03	0.28	0.494
48004	WARLEGGAN AT TRENGOFFE	25.30	10.00	17.43	1533	0.	0.25	0.	0.	0.75	0.	0.	0.720
48005	KENWYN AT TRURO	19.10	7.18	13.10	1121	0.	1.00	0.	0.	0.	0.06	0.	0.646
48009	ST NEOT AT CRAIGSHILL WOOD	22.70	12.17	17.97	1539	0.	0.20	0.	0.	0.80	0.	0.02	0.595
49003	DE LANK AT DE LANK	21.70	8.70	13.80	1681	0.	0.	0.	0.	1.00	0.	0.	0.485
51002	HORNER WATER AT WEST LUCCOMBE	20.80	10.73	34.96	1400	0.	0.90	0.	0.10	0.	0.	0.25	0.559
52004	ISLE AT ASHFORD MILL	90.10	14.30	5.10	904	0.09	0.	0.20	0.71	0.	0.02	0.	0.465
52005	TONE AT BISHOPS HULL	202.00	37.30	5.60	993	0.18	0.47	0.	0.35	0.	0.06	0.	0.570
52006	YEO AT PEN MILL	213.10	16.70	5.50	840	0.30	0.	0.45	0.25	0.	0.05	0.03	0.365
52010	BRUE AT LOVINGTON	135.20	20.35	4.68	909	0.07	0.02	0.63	0.29	0.	0.	0.	0.471
52016	CURRY POOL AT CURRY FARM	15.70	7.15	26.75	918	0.	0.44	0.	0.56	0.	0.	0.	0.743
52020	GALLICA BROOK AT RYME INTRINSICA	16.40	6.46	13.68	980	0.	0.	0.60	0.40	0.	0.01	0.11	0.248
53005	MIDFORD BROOK AT MIDFORD	147.40	24.60	3.00	998	0.60	0.	0.10	0.30	0.	0.03	0.	0.606
53007	FROME AT TELLISFORD	261.60	27.70	2.30	953	0.27	0.03	0.35	0.35	0.	0.02	0.	0.536
53008	AVON AT GT SOMERFORD	303.00	29.79	2.56	838	0.37	0.	0.38	0.25	0.	0.	0.	0.565
53009	WELLOW BROOK AT WELLOW	72.60	16.13	8.15	1025	0.57	0.	0.43	0.	0.	0.07	0.	0.606
54004	SOWE AT STONELEIGH	262.00	28.80	1.92	707	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
54006	STOUR AT KIDDERMINSTER	324.00	35.55	3.07	721	0.38	0.14	0.08	0.40	0.	0.14	0.	0.730
54010	STOUR AT ASCOT PARK	119.00	35.95	2.90	711	0.10	0.	0.40	0.50	0.	0.	0.	0.539
54011	SALWARPE AT HARFORD HILL	134.00	26.91	4.55	691	0.42	0.	0.01	0.57	0.	0.03	0.	0.655
54016	RODEN AT RODINGTON	259.00	40.20	0.92	721	0.50	0.03	0.	0.47	0.	0.	0.	0.607
54019	AVON AT STARETON	347.00	56.70	1.40	676	0.30	0.	0.70	0.	0.	0.04	0.	0.500
54020	PERRY AT YEATON	180.80	31.57	2.56	732	0.14	0.10	0.	0.76	0.	0.02	0.04	0.660
54022	SEVERN AT PLYNLIMON WEIR	8.70	.69	67.70	2489	0.	0.	0.	0.	1.00	0.	0.	0.293
54034	DOWLES BROOK AT DOWLES	40.80	.30	9.78	751	0.	0.20	0.	0.80	[illegible]	[illegible]	[illegible]	0.431
54090	TANLLWYTH AT [illegible]	0.92	1.45	124.07	2552	0.	0.	0.	0.	1.00	0.	0.	0.280
55008	WYE AT CEFN BRWYN	10.40	5.36	47.44	2532	0.	0.	0.	0.	1.00	0.	0.	0.305
55012	IRFON AT CILMERY	244.20	35.27	7.98	1691	0.	0.63	0.	0.	0.37	0.	0.	0.390
55021	LUGG AT BUTTS BRIDGE	371.00	48.51	4.04	915	0.	0.90	0.03	0.	0.07	0.01	0.	0.662
55022	TROTHY AT MITCHEL TROY	142.00	23.76	3.00	913	0.	1.00	0.	0.	0.	0.	0.	0.456
55025	LLYNFI AT THREE COCKS	132.00	18.60	4.03	996	0.	1.00	0.	0.	0.	0.	0.17	0.574
55026	WYE AT DDOLE FARM	174.00	33.30	5.54	1654	0.	0.60	0.	0.	0.40	0.	0.	0.335
55034	CYFF AT PLYNLIMON	3.10	3.01	46.68	2455	0.	0.	0.	0.	1.00	0.	0.	0.250
56002	EBBW AT RHIWDERYN	217.00	35.21	9.74	1491	0.	0.05	0.55	0.	0.40	0.10	0.06	*
56003	HONDDU AT THE FORGE, BRECON	62.20	20.20	9.02	1260	0.	0.78	0.	0.	0.22	0.	0.	0.507
56004	USK AT LLANDETTY	544.00	43.70	4.58	1498	0.	0.60	0.	0.	0.40	0.02	0.08	0.467
56005	LLWYD AT PONTHIR	98.10	25.37	14.23	1425	0.	0.25	0.30	0.	0.45	0.16	0.	0.542
56006	USK AT TRELONG	183.90	22.37	8.87	1709	0.	0.53	0.	0.	0.47	0.	0.11	0.440
56011	SIRHOWY AT WATTSVILLE	76.10	31.33	11.13	1547	0.	0.	0.65	0.	0.35	0.09	0.12	0.314
57004	CYNON AT ABERCYNON	106.00	25.30	7.30	1501	0.	0.	0.30	0.	0.70	0.04	0.	0.430
57005	TAFF AT PONTYPRIDD	454.80	42.26	9.23	1863	0.	0.	0.40	0.	0.60	0.05	0.15	0.489
57006	RHONDDA AT TREHAFOD	100.50	22.59	7.49	2181	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
58002	NEATH AT RESOLVEN	190.90	28.30	13.50	1897	0.	0.	0.10	0.	0.90	0.01	0.	0.322
58005	EWENNY AT [illegible]	62.60	13.67	7.19	1350	0.30	0.30	0.38	0.	0.02	0.05	0.	0.605
58006	MELLTE AT PONT NEATH VAUGHAN	65.80	14.71	25.93	2021	0.	0.	0.	0.	1.00	0.	0.12	0.342
58008	DULAIS AT CILFREW	43.00	14.04	14.94	1665	0.	0.	0.15	0.	0.85	0.	0.	0.359
58009	EWENNY AT KEEPERS LODGE	62.50	13.05	7.67	1350	0.30	0.30	0.38	0.	0.02	0.05	0.	0.622
60002	COTHI AT FELIN MYNACHDY	297.90	50.02	4.56	1646	0.	0.63	0.	0.	0.37	0.	0.	0.464
60003	TAF AT CLOGYFRAN	217.30	33.60	4.21	1411	0.	0.97	0.	0.	0.03	0.	0.	0.616
60006	GWILI AT GLANGWILI	129.50	24.05	5.92	1620	0.	0.90	0.	0.	0.10	0.	0.	0.437
60007	TOWY AT DOLAU HIRION	231.00	34.20	10.15	1749	0.	0.07	0.	0.	0.93	0.	0.	0.406
61001	WESTERN CLEDDAU AT PRENDERGAST MILL	197.60	27.60	3.24	1266	0.	0.95	0.	0.	0.05	0.	0.	0.657
61003	GWAUN AT CILRHEDYN BRIDGE	31.30	9.38	25.47	1474	0.	1.00	0.	0.	0.	0.	0.	0.585
62002	TEIFI AT LLANFAIR-LLANDYSSAL	510.00	70.65	1.53	1479	0.	0.65	0.	0.11	0.24	0.	0.	0.517
64001	DYFI AT DYFI BRIDGE	471.30	37.47	5.22	1863	0.	0.50	0.	0.	0.50	0.	0.	0.359
65001	GLASLYN AT BEDDGELERT	68.60	15.20	33.55	3279	0.	0.02	0.	0.	0.98	0.	0.26	0.307
65801	NANT PERIS AT TAN-YR-ALLT	11.40	4.50	54.22	4128	0.	0.	0.	0.	1.00	0.	0.	*
66002	ELWY AT PANT-YR-ONEN	220.00	37.66	6.77	1175	0.01	0.85	0.	0.01	0.13	0.	0.06	0.444
66004	WHEELER NEAR BODFARI	62.90	11.32	11.96	956	0.67	0.33	0.	0.	0.	0.	0.	0.843
66006	ELWY AT BONT-Y-GWYDDEL	194.00	27.50	5.40	1200	0.	0.83	0.	0.	0.17	0.	0.06	0.479
66011	CONWAY AT CWM LLANERCH	344.50	29.04	17.20	2234	0.	0.51	0.	0.	0.49	0.	0.08	0.305
67003	BRENIG AT PONT-Y-RHUDDWA	20.20	7.09	13.80	1308	0.	0.	0.	0.	1.00	0.	0.	0.382
67005	CEIRIOG AT BRYNKINALT WEIR	113.70	27.87	11.83	1257	0.	0.43	0.	0.	0.57	0.	0.	0.465
67008	ALYN AT PONT Y CAPEL	227.00	45.80	4.97	910	0.15	0.70	0.	0.10	0.05	0.04	0.01	0.558
67010	GELYN AT CYNEFAIL	13.10	5.67	10.55	2200	0.	0.15	0.	0.	0.85	0.	0.06	0.256
68006	DANE AT HULME WALFIELD	150.00	33.96	10.03	1034	0.11	0.03	0.	0.49	0.32	0.02	0.04	0.477
69010	FENDER AT FORD LANE, UPTON	18.40	6.28	8.18	790	0.	0.	0.	1.00	0.	0.24	0.	*
69802	SANDERSONS BROOK AT SANDBACH	4.40	3.24	5.18	749	0.	0.17	0.	0.83	0.	0.	0.	*
69008	DEAN AT STANNEYLANDS	51.80	20.95	12.02	931	0.24	0.47	0.	0.25	0.04	0.03	0.08	*
69011	MICKER BROOK AT CHEADLE	67.30	17.77	7.66	873	0.04	0.17	0.	0.80	0.	0.30	0.	*
69012	BOLLIN AT WILMSLOW	72.50	20.07	9.43	939	0.47	0.33	0.	0.12	0.08	0.07	0.11	*
69013	SINDERLAND BROOK AT PARTINGTON	44.80	13.73	2.92	330	0.	0.84	0.	0.16	0.	0.49	0.	*
69018	NEWTON BROOK AT NEWTON-LE-WILLOWS	32.80	14.37	5.40	885	0.	0.	0.	1.00	0.	0.09	0.	*
[illegible]	WORSLEY BROOK AT ECCLES	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
69027	TAME AT PORTWOOD	150.00	41.40	5.62	1179	0.	0.	0.	0.41	0.59	0.22	0.17	*
69031	NETHERLEY BROOK AT GREEN'S BRIDGE	47.90	9.79	5.46	857	0.	0.07	0.	0.93	0.	0.17	0.	*
69034	MUSBURY BROOK AT HELMSHORE INTAKE	3.10	2.60	86.53	1486	0.	0.	0.	0.	1.00	0.	0.	*
69802	ETHEROW AT WOODHEAD	13.00	5.91	35.71	1530	0.	0.	0.	0.	1.00	0.	0.	*
70006	TAWD AT NEWBURGH	28.90	11.33	8.09	965	0.	0.35	0.	0.65	0.	0.07	0.	*
71003	CROASDALE BECK AT CROASDALE FLUME	10.36	5.24	37.80	1539	0.	0.	0.	0.	1.00	0.	0.	0.355
71004	CALDER AT WHALLEY ABBEY	316.00	37.12	5.02	1227	0.	0.	0.	0.71	0.29	0.09	0.09	0.396
71006	HODDER AT HODDER PLACE	261.00	37.95	4.63	1480	0.	0.	0.	0.38	0.61	0.	0.13	*
71802	RIBBLE AT HALTON WEST	204.70	40.06	5.85	1529	0.	0.	0.	0.17	0.83	0.	0.	0.263
71804	DUNSOP AT FOOTHOLME	24.90	7.24	33.46	1939	0.	0.	0.	0.	1.00	0.	0.	*
72002	WYRE AT ST.MICHAELS-ON-WYRE	275.00	34.17	7.74	1257	0.	0.07	0.	0.46	0.47	0.01	0.	0.323
72006	LUNE AT KIRKBY LONSDALE	507.20	49.60	4.77	1437	0.	0.	0.	0.01	0.99	0.	0.	
72818	NEW MILL BROOK AT CARVERS BRIDGE	54.50	16.77	7.77	1024	0.	0.10	0.	0.87	0.03	0.02	0.	0.166
72820	BURNES GILL AT TEBAY (M6)	0.72	0.80	179.74	1770	0.	0.	0.	0.	1.00	0.	0.	0.292
73005	KENT AT SEDGWICK	209.00	39.20	4.33	1925	0.	0.33	0.	0.	0.68	0.03	0.05	0.461
73007	TROUT BECK AT TROUTBECK BRIDGE	21.60	10.30	21.75	2190	0.	0.	0.	0.	1.00	0.	0.	*
73008	BELA AT BEETHAM	131.00	25.70	9.14	1344	0.	0.92	0.	0.	0.08	0.	0.11	0.495
73803	WINSTER AT LOBBY BRIDGE	20.70	9.82	13.43	1539	0.	0.87	0.	0.	0.13	0.	0.	*
73804	BRATHAY AT BRATHAY HALL	57.50	14.50	8.06	2673	0.	0.	0.	0.	1.00	0.	0.07	*

NUMBER	NAME	AREA	MSL	S1085	SAAR	SOIL1	SOIL2	SOIL3	SOIL4	SOIL5	URBAN	LAKE	BFI
74001	DUDDON AT DUDDON HALL	85.66	19.64	13.01	2187	0.	0.27	0.	0.	0.73	0.	0.05	0.289
75006	NEWLANDS BECK AT BRAITHWAITE	33.90	10.54	21.91	2456	0.	0.47	0.	0.	0.53	0.	0.	0.297
75007	GLENDERMACHIN AT THRELKELD	64.50	15.87	20.17	1900	0.	0.51	0.	0.14	0.32	0.	0.	0.293
76005	EDEN AT TEMPLE SOWERBY	616.40	56.79	4.05	1219	0.	0.	0.	0.30	0.70	0.	0.	0.393
76008	IRTHING AT GREENHOLME	334.60	55.27	5.82	1049	0.10	0.	0.15	0.	0.75	0.	0.01	0.328
76011	COALBURN AT COALBURN	1.52	2.13	27.95	1143	0.	0.	0.	0.	1.00	0.	0.	0.155
76014	EDEN AT KIRKBY STEPHEN	69.40	20.77	18.47	1439	0.	0.	0.	0.16	0.84	0.	0.	0.252
76805	FORCE BECK AT SHAP	4.10	3.10	12.22	1610	0.	0.	0.	0.	1.00	0.	0.	0.273
77002	ESK AT CANONBIE	494.70	53.40	3.69	1550	0.	0.	0.34	0.	0.67	0.	0.04	0.364
83002	GARNOCK AT DALRY	88.80	17.81	20.77	1742	0.	0.	0.	0.55	0.45	0.02	0.16	0.218
84002	CALDER AT MUIRSHIEL	12.40	7.30	25.78	2329	0.	0.	0.	0.	1.00	0.	0.64	*
84008	ROTTEN CALDER AT RED LEES	51.30	18.90	13.45	1175	0.	0.	0.14	0.75	0.12	0.26	0.	0.315
84012	WHITE CART WATER AT HAWKHEAD	227.20	61.16	6.62	1264	0.	0.	0.32	0.50	0.19	0.27	0.12	0.355
84022	DUNEATON AT MAIDENCOTS	110.30	25.90	4.97	1471	0.	0.	0.48	0.	0.52	0.	0.	0.450
85002	ENDRICK WATER AT GAIDREW	219.90	35.44	9.42	1478	0.	0.10	0.15	0.60	0.15	0.01	0.03	0.328

STOP OK

TABLE A.2 EVENT CHARACTERISTICS AND DERIVED MODEL PARAMETERS FOR ALL EVENTS IN THE STUDY

CATCH NO	EV NO	DATE OF STORM	RAINFALL TOTAL (MM)	RAINFALL DURN (H)	PEAK FLOW (CUMECS)	LAG (H)	ANSF (CUMECS)	SMD (MM)	API5 (MM)	CWI (MM)	RUNOFF (MM)	RUNOFF %	1-HOUR UNIT HYDROGRAPH: UH PEAK (CUMECS PER 100 SQ KMS)	TIME TO PEAK (H)	WIDTH AT 0.5 PEAK (H)	UH TIME BASE (H)
19001	7	13 8 66	41.6	20	149.40	9.4	6.34	1.5	4.9	125	23.5	56.5	22.0	7.8	10.0	30.5
19001	8	1 11 67	39.6	32	105.29	6.5	7.79	0.	0.	125	18.0	45.3	25.5	6.0	7.4	28.8
19001	9	22 12 67	18.3	21	113.86	6.6	8.33	0.	4.4	129	10.0	54.6	29.0	7.1	9.5	19.3
19001	10	4 5 68	55.2	34	130.35	6.3	11.61	3.6	6.7	128	28.5	51.7	25.2	5.6	7.1	29.9
19001	11	21 11 69	57.5	29	169.77	14.8	4.22	16.0	2.9	111	33.7	58.7	23.6	8.9	7.8	31.5
19002	1	22 6 66	40.0	24	13.57	3.8	1.36	21.2	9.7	113	20.7	71.5	*	*	*	*
19002	2	13 8 66	47.9	21	15.28	5.9	0.88	1.6	5.3	128	24.5	51.1	16.6	7.4	15.0	37.0
19002	3	5 10 66	27.5	11	12.19	5.7	1.26	0.2	4.4	129	12.8	46.5	22.3	5.1	11.0	27.9
19002	4	11 11 66	27.9	29	9.65	8.8	0.71	0.6	0.4	124	18.9	67.8	15.6	7.9	16.0	39.3
19002	5	18 12 66	25.1	18	11.95	7.0	1.74	0.	5.5	[illegible]	15.0	59.7	24.7	7.2	8.5	28.0
19002	6	6 10 67	27.8	21	11.86	9.8	0.59	4.4	3.8	124	20.6	74.0	16.0	6.9	15.5	[illegible]
19002	7	8 10 67	32.6	21	16.51	11.9	1.05	0.	13.4	138	28.9	88.7	*	*	*	[illegible]
19002	8	1 11 67	38.8	32	11.32	9.5	0.70	0.	0.1	125	22.5	57.9	16.5	5.8	10.0	[illegible]
19002	9	4 5 68	50.8	34	17.71	8.8	2.00	3.6	5.6	126	32.3	63.5	19.0	6.2	[illegible]	[illegible]
19002	10	12 9 68	31.6	16	10.43	7.3	1.08	60.8	5.4	69	15.3	48.4	21.3	9.6	[illegible]	[illegible]
19002	11	21 11 69	64.3	27	18.62	12.3	0.74	0.	3.7	128	39.2	61.0	*	*	*	*
19005	1	13 8 66	42.9	20	105.92	5.5	5.02	1.5	4.9	128	24.6	57.3	26.0	4.3	7.5	27.8
19005	2	5 10 66	22.8	12	67.69	5.6	4.47	0.2	4.4	129	10.2	44.5	30.0	4.8	7.5	22.7
19005	3	18 12 66	21.8	18	65.43	5.5	8.37	0.	5.9	130	12.2	55.9	34.0	6.5	6.2	20.3
19005	4	8 10 67	28.9	21	77.39	10.8	6.55	27.9	9.8	106	20.7	71.7	*	*	*	*
19005	5	1 11 67	38.7	33	79.57	5.2	5.13	0.	0.	125	19.8	51.2	28.0	5.0	6.0	27.7
19005	6	22 12 67	20.2	17	104.01	4.8	9.43	0.	4.4	129	11.4	56.3	33.5	4.0	6.4	20.4
19005	7	4 5 68	49.4	34	82.81	6.6	6.03	3.6	6.7	128	28.2	57.0	25.5	5.7	7.0	29.6
19005	8	12 9 68	29.1	16	66.22	5.7	4.25	60.8	5.3	69	14.7	52.2	*	*	*	*
19005	9	21 11 69	57.7	27	132.04	12.2	4.27	0.	4.9	129	39.2	67.9	24.0	5.6	7.5	31.3
20001	1	14 3 64	26.6	18	49.18	4.8	5.00	0.9	1.4	125	7.1	26.6	*	*	*	*
20001	2	10 10 64	46.1	24	36.51	12.2	1.16	61.9	2.3	65	8.5	18.4	17.0	8.3	13.0	39.4
20001	3	27 7 65	37.0	40	44.83	15.5	1.94	50.7	5.1	79	10.9	29.4	17.9	8.0	10.2	41.7
20001	4	17 9 65	29.2	15	63.55	12.6	4.55	0.8	0.5	124	10.7	36.7	*	*	*	*
20001	5	3 8 66	100.3	33	113.00	16.1	1.53	71.4	0.2	53	26.8	26.7	15.8	12.0	11.6	47.2
20001	6	13 8 66	54.8	19	98.71	12.1	4.76	1.1	4.0	127	21.7	39.5	17.9	10.1	12.8	36.5
20001	7	5 11 66	22.4	15	64.44	6.9	9.58	0.	4.7	129	7.7	34.3	24.0	7.0	9.0	28.3
20001	9	4 5 68	45.1	46	58.85	10.5	6.42	7.5	7.8	125	18.5	41.0	*	*	*	*
20001	10	14 7 68	51.5	53	69.05	9.7	2.90	59.0	4.2	70	16.1	31.2	15.7	8.5	14.0	42.8
20001	11	31 10 68	47.3	37	52.68	13.7	2.51	30.0	2.0	97	18.5	39.5	*	*	*	*
21030	1	17 9 69	24.3	7	16.60	4.0	1.33	63.8	0.1	61	6.5	26.6	*	*	*	*
21030	2	21 11 69	58.1	23	29.64	8.5	2.52	11.0	4.1	118	27.1	46.6	*	*	*	*
21030	7	17 6 72	22.3	10	12.79	12.1	1.01	13.5	0.3	111	6.4	28.7	*	*	*	*
21030	8	8 11 72	41.5	9	26.63	5.6	1.14	85.6	0.6	40	13.3	32.1	*	*	*	*
23002	1	27 6 63	45.8	44	25.88	14.3	1.10	48.3	4.8	81	12.9	28.1	*	*	*	*
23002	2	23 8 63	17.3	8	22.32	4.3	1.93	25.5	1.0	100	3.6	20.9	42.8	6.3	5.8	14.4
23002	3	9 11 63	31.1	16	37.04	5.1	3.45	0.	1.9	126	11.6	37.4	*	*	*	*
23002	4	11 11 63	22.7	13	39.24	5.0	5.50	0.	10.2	135	10.4	45.9	*	*	*	*
23002	5	20 11 63	23.6	15	51.03	5.1	5.32	0.	4.8	129	11.8	50.1	38.0	4.5	6.0	17.3
23002	6	24 3 64	15.9	16	31.46	6.1	6.75	0.	5.1	130	6.0	38.0	35.5	4.0	6.5	18.3
23002	9	6 12 64	29.4	21	24.49	5.7	2.80	27.5	9.9	107	9.3	31.5	41.6	5.0	6.5	13.7
23002	10	15 1 65	26.2	36	27.60	4.6	4.08	0.	7.2	132	10.5	40.1	30.6	5.3	8.5	19.3
23002	12	6 9 65	19.8	8	20.40	6.4	1.87	4.3	6.1	126	5.9	30.0	27.5	6.4	9.8	20.8
23005	3	16 10 67	40.3	14	236.59	4.2	11.38	0.2	6.0	130	23.3	57.7	*	*	*	*
23005	4	1 11 67	28.2	9	130.92	6.3	5.00	1.0	0.4	124	13.2	47.0	*	*	*	*
23005	8	12 9 68	42.0	13	143.46	4.5	6.93	11.6	6.8	120	22.6	53.7	27.2	5.5	7.5	25.9
23005	9	17 9 68	26.0	10	140.25	5.6	4.42	26.1	0.8	99	11.8	45.3	42.0	7.5	6.5	13.5
23005	10	30 10 70	28.1	11	261.60	4.7	12.47	0.	11.2	136	19.4	69.1	38.0	7.9	6.5	16.3
23005	11	8 11 72	31.7	14	140.33	3.6	10.24	6.2	1.7	120	14.7	46.3	54.5	5.5	5.0	10.4
23006	6	12 9 68	42.4	16	210.00	2.9	11.47	5.6	10.1	129	17.3	40.7	*	*	*	*
23010	2	30 10 70	21.1	11	56.96	2.8	3.15	0.	6.5	131	8.8	41.6	*	*	*	*
23010	5	16 3 72	19.9	7	28.04	4.7	1.12	2.7	0.3	122	6.2	31.4	*	*	*	*
23010	6	11 5 72	17.3	19	24.52	9.4	1.19	2.4	2.4	125	9.2	53.5	*	*	*	*
23010	7	3 5 73	27.8	30	55.99	6.2	1.02	7.6	0.8	118	14.1	50.8	*	*	*	*
23010	8	10 11 74	21.4	13	60.75	4.4	3.46	0.	5.4	130	11.5	53.7	*	*	*	*
23010	12	22 2 76	23.9	21	59.58	3.3	2.74	0.	0.5	125	15.6	65.1	*	*	*	*

1-HOUR UNIT HYDROGRAPH

CATCH NO	EV NO	DATE OF STORM	RAINFALL TOTAL (MM)	RAINFALL DURN (H)	PEAK FLOW (CUMECS)	LAG (H)	ANSF (CUMECS)	SMD (MM)	APIS (MM)	CWI (MM)	RUNOFF (MM)	RUNOFF %	UH PEAK (CUMECS PER 100 SQ KMS)	TIME TO PEAK (H)	WIDTH AT 0.5 PEAK (H)	UH TIME BASE (H)
24003	1	9 11 63	26.9	16	70.89	4.2	4.80	0.	3.3	128	13.9	51.8	*	*	*	*
24003	8	25 9 65	42.9	15	72.81	7.6	2.06	1.7	1.0	124	18.1	42.2	*	*	*	*
24003	11	2 10 66	48.4	34	121.03	5.6	1.85	3.7	3.3	124	20.7	42.8	*	*	*	*
24003	16	4 9 67	34.9	35	64.67	5.1	3.86	0.	14.1	139	15.7	45.1	*	*	*	*
24003	17	6 10 67	25.5	18	76.80	6.2	3.30	0.6	4.1	128	15.4	60.6	*	*	*	*
24005	1	8 12 54	33.6	11	34.99	3.0	4.24	3.2	0.3	122	9.8	29.2	21.0	7.5	10.7	31.6
24005	2	27 8 56	27.7	10	31.02	10.0	1.87	0.8	1.8	125	7.3	26.4	23.1	9.8	9.7	28.7
24005	5	13 3 64	36.5	31	27.30	3.5	2.82	0.	3.4	128	8.0	21.9	23.0	5.0	9.5	29.3
24005	7	23 3 64	30.1	30	44.48	9.1	4.73	0.5	1.6	126	11.0	36.6	29.0	7.5	5.2	21.9
24005	8	28 9 65	14.9	8	18.60	8.6	1.80	25.3	3.3	103	3.3	21.9	27.0	8.5	8.5	24.2
24005	9	30 9 65	14.9	12	20.44	[illegible]	4.36	0.	10.5	135	3.4	22.5	28.1	9.0	6.0	23.6
24005	10	17 11 65	43.0	46	48.39	6.5	11.43	0.	10.0	134	15.8	36.7	*	*	*	*
24005	12	9 4 66	21.6	12	42.39	7.7	5.10	1.0	7.7	131	9.5	44.0	31.0	6.0	7.1	21.7
24005	13	12 8 66	35.4	33	20.74	11.0	1.34	38.8	5.4	91	8.2	23.0	23.0	7.0	8.5	31.3
24005	14	2 10 66	39.?	37	21.81	13.5	1.18	17.4	2.9	110	8.6	21.5	*	*	*	*
24005	15	8 8 67	42.8	21	28.38	10.1	0.96	62.0	1.5	64	5.7	13.4	35.6	4.7	5.9	19.4
24005	16	16 10 67	42.5	16	40.67	8.1	1.54	0.6	1.7	126	11.8	27.7	*	*	*	*
24005	17	1 11 67	16.0	9	19.10	9.5	1.99	1.2	0.7	124	3.8	23.9	30.0	8.5	8.5	20.1
24005	18	4 11 67	56.2	22	58.48	9.0	4.29	0.	2.5	127	23.1	41.1	21.0	7.0	10.0	33.0
24005	19	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.	3.0	126	29.6	41.2	*	*	*	*
24005	21	11 1 69	18.6	17	22.74	11.1	2.49	0.2	0.9	125	5.7	30.7	25.0	6.5	8.8	26.9
24005	22	2 5 69	19.4	18	26.49	7.7	2.29	8.1	2.4	119	4.3	22.2	32.1	7.0	6.9	20.8
24005	23	6 5 69	15.5	12	30.78	5.5	4.98	0.6	5.4	129	5.3	34.0	32.8	6.5	6.9	20.1
24007	2	30 10 68	73.5	54	12.46	11.1	0.80	0.	2.1	127	42.6	57.9	*	*	*	*
24007	5	11 1 69	18.0	17	8.03	7.3	1.25	0.2	1.0	125	7.9	44.0	32.2	5.7	7.3	19.9
24007	[illegible]	2 2 69	16.2	17	8.27	5.7	0.71	5.8	2.2	121	4.3	26.2	41.0	4.8	5.5	16.1
24007	7	5 5 69	15.0	22	8.47	5.4	1.48	4.3	9.2	129	5.9	39.5	35.3	4.6	6.7	18.1
24007	8	23 6 69	21.6	21	8.86	6.7	0.49	11.8	3.5	116	5.7	26.3	35.0	4.0	6.3	19.2
24007	9	17 9 69	20.2	11	8.36	5.0	0.67	42.0	2.0	85	5.1	25.3	[illegible]	4.9	6.0	17.6
24007	11	20 1 71	16.7	12	7.24	5.8	0.70	2.7	1.3	123	5.7	33.9	33.0	7.3	7.5	18.7
24007	13	22 4 71	51.9	33	13.66	12.0	0.66	21.3	0.0	103	18.8	36.2	24.2	8.2	8.0	30.0
25003	2	21 11 63	35.9	18	12.29	3.0	0.33	0.	11.0	135	[illegible]	[illegible]	[illegible]	5.0	4.4	14.5
25003	3	8 8 64	36.5	8	14.33	2.8	0.46	83.3	12.1	53	18.3	50.1	49.4	4.0	5.0	12.5
25003	5	15 9 65	38.6	14	13.52	2.4	0.27	3.3	0.7	122	23.0	59.7	47.2	4.0	5.0	13.6
25003	11	2 7 68	29.7	8	24.11	2.5	0.92	0.	11.6	136	21.9	73.6	64.7	4.0	3.8	9.6
25003	13	20 9 68	40.5	11	13.74	3.5	0.67	0.	21.3	146	32.6	80.5	49.6	2.9	5.4	11.6
25004	3	21 1 59	28.5	32	26.85	4.1	10.28	0.	9.3	134	4.9	17.0	*	*	*	*
25004	5	14 3 64	26.7	28	24.07	6.2	3.91	2.0	4.2	127	6.9	25.7	*	*	*	*
25004	8	9 4 66	23.8	13	29.67	12.0	6.86	0.4	7.7	132	7.0	29.6	13.9	10.4	16.8	46.4
25004	9	16 10 67	43.5	18	32.23	11.1	3.86	1.0	5.3	129	10.9	25.0	*	*	*	*
25004	10	4 11 67	50.1	23	35.50	16.2	3.88	0.2	2.9	127	20.3	40.6	*	*	*	*
25006	[illegible]	[illegible]	[illegible]	30	[illegible]	[illegible]	0.94	21.6	0.8	104	43.2	53.9	*	*	*	*
25006	4	20 11 71	24.3	9	29.11	5.4	1.63	0.2	1.9	126	9.8	40.3	*	*	*	*
25011	3	16 3 72	35.4	5	15.16	1.5	0.66	1.2	0.2	124	16.6	46.8	*	*	*	*
25012	3	16 3 72	31.5	15	36.06	1.3	0.86	2.8	0.4	122	22.7	72.2	75.4	1.8	2.6	9.5
25012	4	17 6 72	16.8	14	11.59	3.1	0.34	12.0	0.2	113	10.0	59.6	48.9	2.7	4.6	13.5
25810	3	13 7 61	81.2	33	0.05	2.0	0.00	53.9	11.0	82	34.9	43.0	*	*	*	*
25810	4	3 8 61	58.7	19	0.09	3.8	0.00	50.4	0.7	75	26.6	45.3	83.9	1.5	2.1	9.1
25810	5	16 10 61	69.?	30	0.09	3.5	0.00	4.1	1.2	122	45.6	65.2	97.0	2.4	2.5	6.5
25810	6	17 8 61	25.5	30	0.02	6.4	0.00	50.7	1.2	75	14.0	49.0	57.5	2.4	3.0	13.3
25810	7	21 8 61	17.3	16	0.03	2.8	0.00	45.7	13.9	93	10.8	62.3	85.3	2.3	2.5	8.0
27001	6	9 11 63	29.9	15	76.62	5.5	11.99	36.8	3.9	92	6.5	21.7	*	*	*	*
27001	7	20 11 63	34.3	23	148.95	10.8	18.55	0.	5.5	130	14.1	41.2	*	*	*	*
27001	8	13 3 64	42.0	24	84.21	5.9	8.46	0.	4.1	129	12.2	29.1	16.7	10.2	14.5	37.6
27001	9	23 3 64	29.3	26	89.63	12.4	15.54	0.8	1.9	126	13.3	44.5	18.0	10.0	12.7	36.4
27001	15	22 2 67	23.7	12	93.14	8.1	13.87	0.	4.9	129	7.7	32.4	24.0	8.2	8.7	28.9
27001	16	27 2 67	35.9	26	138.30	14.8	14.87	0.	3.6	128	14.9	41.6	*	*	*	*
27001	18	17 8 67	34.3	34	133.17	15.0	9.83	27.6	7.0	104	14.5	41.5	*	*	*	*
27001	19	16 10 67	51.3	29	274.16	15.5	19.52	1.4	6.7	130	32.9	64.1	*	*	*	*
27001	20	2 7 68	18.5	10	166.69	6.1	19.93	5.0	19.3	136	9.5	51.5	*	*	*	*
27001	21	11 9 68	66.5	31	303.85	13.8	10.74	51.6	7.4	80	34.7	51.9	*	*	*	*
27001	22	30 10 68	38.9	36	87.37	8.9	21.48	0.	2.4	127	9.8	25.1	18.5	9.7	10.8	38.5
27001	23	1 11 68	37.7	26	227.90	13.3	29.99	0.	18.3	143	23.4	62.1	*	*	*	*
27010	22	19 9 68	60.1	42	9.34	7.9	0.26	55.0	0.4	37	20.5	34.2	*	*	*	*
27026	1	24 11 63	28.5	31	29.96	9.1	1.95	0.	1.3	126	9.7	34.1	*	*	*	*
27026	3	8 9 65	30.0	13	34.73	5.6	1.87	0.2	11.1	135	8.8	29.4	*	*	*	*
27026	4	8 12 65	44.2	40	54.91	10.1	3.20	0.1	2.4	127	23.8	53.9	*	*	*	*
27026	5	8 4 66	21.1	12	42.04	4.9	3.70	0.	2.7	127	9.0	42.9	*	*	*	*
27026	6	8 3 67	34.6	29	25.09	7.7	1.30	4.0	1.1	122	7.6	21.8	24.7	5.7	7.3	30.4
27026	7	13 5 67	37.6	31	44.19	10.6	1.78	0.1	6.7	131	15.8	42.0	*	*	*	*
27026	8	14 7 68	38.2	17	35.28	10.4	0.62	17.8	5.1	112	10.4	27.1	22.5	13.5	10.3	28.8
27026	9	1 11 68	33.3	19	31.09	5.4	2.05	0.	3.1	128	10.6	31.8	*	*	*	*
27027	1	7 1 65	15.0	14	129.37	6.1	15.36	0.	4.3	129	9.3	62.1	30.7	6.5	8.1	20.0
27027	4	16 4 65	12.4	15	71.28	3.4	15.85	0.	2.4	127	4.2	33.9	*	*	*	*
27027	5	2 8 65	18.9	12	78.50	4.5	10.98	0.	6.1	131	5.5	29.0	*	*	*	*
27027	6	3 8 65	17.6	14	87.25	4.7	12.97	3.5	15.4	136	6.0	34.4	30.7	7.0	8.1	20.0
27027	7	9 9 65	11.7	9	79.22	6.1	10.94	0.	5.5	130	4.8	41.4	*	*	*	*
27027	8	25 9 65	42.9	23	153.60	6.0	10.91	0.2	3.7	128	20.2	47.1	19.6	8.0	13.5	29.7
27027	9	29 10 65	14.1	13	90.93	3.8	9.98	0.	3.3	128	5.1	36.5	*	*	*	*
27027	10	30 10 65	45.8	45	195.90	9.6	13.01	0.	10.0	135	37.1	81.0	*	*	*	*
27027	11	16 12 65	32.1	36	278.68	9.4	26.04	0.	5.8	130	28.5	88.7	*	*	*	*
27027	12	4 2 66	19.6	15	163.88	5.1	24.43	0.	3.1	128	16.9	91.0	*	*	*	*
27027	13	7 2 66	49.7	30	165.25	9.8	22.47	0.	9.2	134	22.5	45.3	*	*	*	*
27027	14	26 6 66	21.3	21	80.56	5.1	[illegible]	3.6	4.8	126	7.9	37.2	*	*	*	*
27027	15	14 11 66	26.7	37	144.45	5.5	21.59	0.	9.1	134	13.1	49.0	*	*	*	*
27027	18	17 12 66	37.3	23	194.38	9.3	19.26	0.1	1.0	125	28.8	77.2	*	*	*	*
27027	19	18 12 66	29.9	20	173.58	9.4	30.26	0.	18.0	143	16.0	53.7	23.9	7.6	10.2	26.1

1-HOUR UNIT HYDROGRAPH

CATCH NO	EV NO	DATE OF STORM	RAINFALL TOTAL (MM)	RAINFALL DURN (H)	PEAK FLOW (CUMECS)	LAG (H)	ANSF (CUMECS)	SMD (MM)	APIS (MM)	CWI (MM)	RUNOFF (MM)	RUNOFF %	UH PEAK (CUMECS PER 100 SQ KMS)	TIME TO PEAK (H)	WIDTH AT 0.5 PEAK (H)	UH TIME BASE (H)
27027	20	16 10 67	61.9	23	310.91	10.5	31.19	0.	13.0	138	35.3	57.0	25.4	7.5	9.0	25.8
27027	21	4 11 67	38.5	20	123.33	5.7	20.45	0.	3.1	128	14.5	37.6	24.1	7.0	10.8	24.5
27027	22	18 3 68	47.1	33	224.37	10.7	22.36	0.	8.4	133	39.4	83.6	23.4	10.2	10.0	27.5
27027	24	30 10 68	49.8	37	206.50	7.3	34.68	0.	8.4	133	25.0	50.2	22.4	8.8	9.3	31.0
27027	25	1 11 68	34.6	22	171.18	8.0	51.01	0.	23.8	145	14.3	41.3	25.0	7.0	9.9	24.7
27027	27	30 3 69	65.5	21	259.85	9.5	32.42	0.	1.1	126	24.1	36.8	23.0	9.0	10.1	28.1
27027	30	9 11 72	32.4	16	222.59	9.1	11.83	0.	1.3	126	17.9	55.1	35.0	8.3	7.0	17.8
27027	31	11 2 71	47.5	54	214.67	5.6	12.66	0.	0.	125	32.8	69.0	*	*	*	*
27027	32	20 11 71	36.9	12	[illegible]	7.5	11.65	0.	2.8	127	13.6	37.3	*	*	*	*
27031	5	21 1 75	31.3	18	124.09	7.3	11.45	0.8	8.2	132	18.7	59.6	37.8	5.0	5.9	17.6
27031	6	30 4 75	35.1	14	76.43	3.7	4.59	8.3	3.3	119	8.9	25.5	36.6	4.9	6.8	16.8
27034	1	14 8 67	21.7	14	140.97	7.6	13.23	0.4	5.6	130	11.1	51.3	26.0	7.7	14.7	13.4
27034	2	17 8 67	46.9	23	208.41	8.7	17.01	3.6	4.1	125	24.5	52.3	23.5	7.7	12.6	22.1
27034	3	13 10 67	43.6	42	202.45	11.5	20.54	0.	3.3	128	29.1	66.7	*	*	*	*
27034	4	16 10 67	62.9	30	321.87	11.6	33.13	1.0	12.4	136	42.3	67.2	*	*	*	*
27034	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.	1.0	[illegible]	27.0	64.9	*	*	*	*
27034	6	19 3 68	75.3	31	295.50	9.5	26.25	0.	8.0	132	42.8	56.9	*	*	*	*
27034	7	22 3 68	88.5	43	379.28	11.5	22.83	0.	8.4	133	66.5	75.1	*	*	*	*
27034	8	11 9 68	76.2	13	270.65	11.9	17.03	45.8	6.0	85	34.4	45.1	*	*	*	*
27034	10	2 11 71	53.0	25	206.51	17.3	9.81	3.7	0.3	121	33.8	63.7	*	*	*	*
27034	11	12 8 71	25.2	29	190.75	1.8	44.88	42.5	10.5	93	18.8	74.7	*	*	*	*
27035	1	10 11 69	31.8	21	58.59	6.2	13.37	27.1	12.6	110	11.5	36.1	21.6	7.0	11.1	29.3
27035	2	19 2 70	12.5	9	[illegible]	7.5	10.97	0.	2.7	127	6.4	51.4	24.5	8.2	9.8	27.8
27035	3	12 4 70	31.5	17	53.40	6.9	4.61	2.1	1.3	124	10.4	33.1	20.7	5.8	10.0	33.7
27035	4	30 10 70	25.9	8	58.93	5.5	16.64	96.9	11.0	59	7.6	29.5	*	*	*	*
27035	6	11 2 71	32.2	19	54.37	10.8	3.53	0.	0.	125	13.3	41.4	18.1	6.9	11.0	39.4
27035	7	18 10 71	47.6	24	59.61	12.0	11.01	71.4	5.4	59	18.1	38.1	*	*	*	*
27035	8	20 11 71	24.5	11	52.99	7.5	6.19	0.	1.5	126	9.0	36.9	25.0	8.2	8.9	26.7
27035	9	9 11 72	33.0	16	45.64	8.1	1.40	[illegible]	1.4	40	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
27035	10	30 11 72	22.1	11	37.58	6.8	13.80	0.	5.1	130	8.0	36.3	23.0	6.5	9.5	29.3
27035	11	24 11 74	23.9	19	54.05	11.4	9.44	0.0	4.4	129	10.0	41.7	18.9	7.5	11.5	35.8
27035	12	30 4 75	25.9	26	32.72	9.8	1.85	12.7	1.8	114	6.4	24.9	19.0	7.3	12.4	33.7
27051	4	13 11 74	16.1	18	1.17	5.0	0.14	0.	2.6	127	5.0	30.8	40.0	3.5	5.5	16.8
27051	5	24 11 74	19.3	22	1.99	5.5	0.20	0.	6.1	131	6.3	32.8	35.0	3.8	5.6	20.6
27051	6	10 12 74	9.5	7	1.82	3.2	0.36	0.	1.2	126	3.5	37.2	53.0	3.1	4.5	12.0
27051	7	18 4 75	11.9	12	0.80	3.2	0.13	0.	3.7	128	2.4	19.8	*	*	*	*
27051	9	1 1 76	16.4	15	2.91	4.7	0.18	9.1	3.4	119	8.5	51.8	54.0	3.4	4.6	11.4
27051	10	8 1 76	20.1	23	1.22	5.0	0.14	0.	0.7	125	3.6	27.7	*	*	*	*
27051	12	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	17.3	[illegible]	117	5.2	29.9	[illegible]	[illegible]	[illegible]	[illegible]
27051	[illegible]	[illegible]	[illegible]	[illegible]	2.46	4.1	0.25	6.5	20.7	139	12.1	31.7	*	*	*	*
28016	5	1 11 68	39.0	17	16.80	27.9	3.23	0.	2.6	127	9.8	25.1	6.8	30.0	[illegible]	94.8
28016	8	16 3 69	27.8	45	15.01	28.1	5.03	0.	3.0	128	9.6	34.5	*	*	*	*
28016	9	16 11 69	30.2	20	15.88	23.5	3.09	2.6	3.5	125	8.0	[illegible]	8.8	17.3	27.5	71.4
28016	10	12 4 70	43.2	21	17.11	22.6	2.86	1.2	1.0	124	[illegible]	22.0	8.6	16.6	30.5	68.3
28023	1	8 12 65	65.4	35	36.52	11.2	10.48	0.	5.7	130	21.1	32.3	16.5	7.9	10.9	45.6
28023	2	21 12 65	38.6	28	18.56	13.3	9.61	0.	3.7	128	8.4	21.8	9.0	12.5	27.0	69.6
28023	3	28 12 65	29.8	16	14.64	10.4	6.86	0.3	0.1	124	4.3	14.4	12.7	11.2	21.3	45.0
28023	5	19 2 66	16.0	17	13.94	8.2	7.02	0.	12.0	137	3.2	20.3	16.2	7.8	14.6	39.4
28023	6	26 6 66	24.5	14	8.68	8.4	3.27	0.	10.2	135	2.7	11.0	*	*	*	*
28023	8	14 9 66	40.7	22	15.52	9.3	4.34	0.	5.0	130	4.3	10.6	19.0	[illegible]	8.1	42.3
28023	9	8 12 66	24.3	23	14.38	10.7	7.62	0.	5.1	130	4.7	19.2	11.8	11.4	22.8	48.6
28023	10	3 10 67	21.2	14	10.49	7.4	4.03	0.	8.0	132	1.8	8.6	21.5	9.2	9.9	31.9
28023	11	16 10 67	46.6	30	16.27	11.9	5.08	0.6	5.2	129	9.4	20.2	*	*	*	*
28026	1	4 11 67	24.2	24	40.02	24.4	2.49	0.	2.5	127	14.3	59.0	9.1	30.0	25.5	71.2
28026	3	10 7 68	51.2	23	56.87	29.7	1.74	19.5	3.8	109	22.0	42.9	7.2	29.1	36.5	81.4
28026	4	1 11 68	26.1	19	43.99	25.2	1.72	0.	3.5	128	14.2	54.6	8.7	25.4	31.3	65.2
28026	6	11 3 69	27.9	40	36.00	24.5	2.26	4.1	0.	120	12.1	43.4	8.6	24.8	29.5	70.3
28026	7	5 5 69	36.3	13	56.63	16.1	3.74	13.0	0.7	112	15.1	41.5	10.5	15.4	25.8	54.3
28033	1	26 6 66	47.2	25	2.62	4.7	0.36	4.0	8.5	129	15.2	32.2	32.9	2.3	6.2	21.5
28033	2	28 7 66	27.4	15	1.59	3.7	0.07	14.4	2.9	113	3.0	10.8	59.1	2.9	3.4	12.0
28033	3	14 9 66	36.3	7	4.63	6.1	0.40	0.	9.5	134	15.0	41.3	54.2	2.8	3.1	14.4
28033	4	3 10 66	14.3	7	2.11	2.7	0.17	0.	7.8	132	2.7	18.7	80.8	2.4	2.8	8.2
28033	5	13 5 67	12.4	4	1.61	2.2	0.23	1.5	5.5	128	2.5	20.5	67.1	2.8	3.7	9.1
28033	6	14 5 67	15.4	19	1.83	2.7	0.46	0.	12.1	137	5.0	32.4	60.8	2.3	2.8	12.7
28033	7	29 9 67	17.4	9	1.67	3.5	0.21	19.0	5.7	111	3.5	20.2	57.9	1.8	3.4	12.5
28033	8	3 10 67	24.7	15	3.47	4.7	0.45	0.	9.6	134	6.5	26.4	51.3	2.9	3.3	15.1
28041	1	5 8 73	46.4	16	41.37	6.1	0.55	3.2	7.0	128	20.6	44.5	*	*	*	*
28041	4	19 8 70	31.0	22	25.16	6.2	0.80	14.5	2.6	113	18.0	58.2	*	*	*	*
28041	5	5 4 70	15.5	13	7.92	2.2	0.96	0.8	2.1	126	4.5	29.1	*	*	*	*
28041	6	7 12 69	6.2	7	5.70	4.0	1.01	0.	3.6	128	3.4	54.5	*	*	*	*
28041	7	10 11 69	20.5	15	19.60	1.4	1.04	0.	12.4	137	8.0	38.8	*	*	*	*
28070	2	1 12 37	56.3	25	5.88	3.5	0.56	0.	5.5	130	20.9	37.1	33.4	2.9	7.6	18.0
28070	5	9 10 61	27.9	13	3.22	3.0	0.22	70.7	3.7	58	7.2	25.9	51.9	1.8	4.9	11.7
28070	7	18 7 64	49.8	10	7.19	3.2	0.21	39.1	2.5	88	18.0	36.1	36.4	2.4	5.1	20.3
28070	8	11 12 64	57.0	44	6.14	7.7	0.19	24.4	2.6	103	44.1	77.4	29.3	3.6	9.3	19.5
28070	10	8 9 65	41.9	12	5.45	3.1	0.35	1.3	7.6	131	13.7	32.6	43.2	2.6	5.0	15.8
28070	12	8 4 66	26.1	11	3.69	5.6	0.40	0.	3.9	128	11.6	44.3	*	*	*	*
28070	14	14 5 67	45.9	15	2.81	5.2	0.26	2.0	6.3	129	9.4	20.5	*	*	*	*
28070	15	16 10 67	56.6	36	5.20	3.9	0.21	16.8	3.4	111	23.8	42.0	*	*	*	*
28070	18	5 5 69	26.6	12	4.20	2.3	0.28	6.4	0.6	119	13.1	49.3	43.3	2.6	6.2	13.3
29001	2	21 4 62	16.0	11	1.25	7.9	0.34	2.0	1.6	124	0.4	2.7	22.0	5.6	11.4	27.7
29001	4	17 8 63	44.4	27	1.47	12.0	0.23	57.7	2.0	69	1.1	2.5	13.4	11.6	19.6	43.8
29001	5	20 11 65	32.6	14	2.51	7.8	0.56	0.	3.7	128	1.1	3.3	20.6	5.7	11.5	31.0
29001	6	26 10 66	19.7	18	0.81	6.9	0.21	11.6	1.6	115	0.3	1.7	22.4	5.1	10.2	29.2
29001	7	27 2 67	17.8	19	1.13	5.7	0.42	1.2	1.6	125	0.4	2.4	20.0	12.0	12.6	30.4
29001	8	10 7 68	60.4	24	1.09	5.3	0.17	71.2	1.8	55	0.6	1.0	*	*	*	*
29001	9	1 11 68	53.8	34	3.70	3.8	0.83	0.	4.7	129	1.8	3.3	23.0	5.0	9.3	29.7
29001	10	14 7 73	77.4	26	3.97	10.7	0.13	47.0	1.1	79	1.5	1.8	[illegible]	[illegible]	[illegible]	[illegible]

CATCH NO	EV NO	DATE OF STORM	RAINFALL TOTAL (MM)	RAINFALL DURN (H)	PEAK FLOW (CUMECS)	LAG (H)	ANSF (CUMECS)	SMD (MM)	APIS (MM)	CWI (MM)	RUNOFF (MM)	RUNOFF %	1-HOUR UNIT HYDROGRAPH UH PEAK (CUMECS PER 100 SQ KMS)	TIME TO PEAK (H)	WIDTH AT 0.5 PEAK (H)	UH TIME BASE (H)
29001	11	6 10 74	53.1	35	1.28	12.8	0.14	84.4	4.8	45	0.9	1.8	*	*	*	*
29004	2	2 6 69	26.9	16	5.38	7.5	0.68	9.4	2.2	117	4.6	17.1	20.2	5.8	12.6	29.8
29004	3	27 7 69	50.8	11	7.60	9.7	0.06	94.0	1.1	32	5.9	11.7	22.9	8.0	10.9	26.8
29004	4	16 11 69	31.6	11	8.62	9.9	0.69	42.2	2.1	54	8.2	25.8	18.9	9.3	11.3	35.2
29004	5	12 4 70	33.1	17	7.43	11.2	0.65	0.7	0.4	124	8.9	26.9	17.1	10.2	11.6	41.8
29004	6	8 3 72	11.2	12	6.05	9.7	1.74	0.	8.9	133	4.1	36.6	*	*	*	*
29004	7	15 7 73	58.6	20	9.23	13.7	0.60	45.0	1.4	81	12.6	21.4	14.1	9.4	15.8	47.3
29004	8	6 10 74	53.1	25	6.72	13.6	0.69	79.0	4.9	50	16.9	31.8	*	*	*	*
29004	11	18 4 75	19.4	14	6.66	7.2	0.95	0.	3.2	128	5.3	27.1	22.0	6.0	10.9	28.7
30001	1	29 10 60	17.6	14	16.82	22.7	4.78	0.	2.9	127	5.3	30.1	9.0	21.2	24.3	75.0
30001	2	3 12 60	35.2	20	27.12	32.9	4.99	0.	0.2	125	13.2	37.4	9.0	19.7	25.5	72.6
30001	3	18 12 60	35.9	47	23.87	18.0	4.57	0.	0.1	125	9.8	27.2	10.0	18.8	24.8	61.6
30001	4	28 11 65	25.9	14	17.27	23.8	3.41	0.	2.2	127	5.9	22.8	10.0	19.0	19.6	72.0
30001	5	9 12 65	20.2	18	18.70	22.1	4.93	0.	4.2	129	6.5	32.0	9.2	19.0	24.6	71.7
30001	6	18 12 65	16.7	18	16.80	19.4	7.90	0.	4.1	129	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
30001	7	13 5 67	47.7	41	23.38	33.7	2.08	3.6	5.4	126	15.3	32.0	*	*	*	*
30001	8	1 11 68	36.5	19	26.35	26.9	2.90	0.	5.5	130	11.7	32.2	9.0	20.5	26.5	70.6
30001	9	5 5 69	27.7	10	19.29	22.4	2.26	15.0	0.8	110	6.0	21.8	10.6	21.0	19.7	65.5
30001	10	22 1 71	24.0	23	13.90	17.5	2.57	29.0	1.8	97	4.6	19.1	10.0	24.0	26.0	59.2
30001	13	8 3 75	35.8	18	33.34	19.2	3.28	0.	2.0	127	11.1	30.9	11.0	16.0	21.0	59.1
30004	1	19 12 62	15.5	10	3.09	9.8	0.52	0.	0.6	125	2.3	14.7	18.5	8.2	12.9	34.4
30004	3	28 11 65	34.9	16	11.05	10.9	0.98	0.	3.1	128	10.1	27.4	19.0	11.5	11.6	35.0
30004	4	17 12 65	18.9	19	5.45	13.4	1.25	0.	3.4	133	5.1	27.2	*	*	*	*
30004	5	5 11 67	15.2	16	3.72	10.1	0.86	9.9	6.6	121	3.3	21.9	18.2	11.1	12.5	36.1
30004	6	10 7 68	105.5	24	13.34	12.2	0.36	57.2	3.1	70	15.1	15.3	*	*	*	*
30004	7	7 8 68	33.8	7	5.09	5.7	0.67	32.3	2.3	94	2.9	8.6	29.0	6.0	9.0	20.3
30004	8	15 9 68	30.1	29	6.58	6.9	0.74	2.8	1.9	124	6.6	22.0	22.2	10.0	13.5	23.1
30004	9	1 11 68	48.7	26	10.17	10.9	0.92	0.	6.4	131	12.2	25.0	18.5	10.7	12.5	35.1
30004	10	[illegible] 74	11.9	[illegible]	4.33	[illegible]	0.92	0.	5.2	130	2.4	20.1	23.0	10.0	10.0	28.2
30004	11	6 10 74	27.7	8	7.88	10.7	0.90	50.4	5.4	79	6.7	24.3	20.0	11.6	12.0	31.6
30004	12	18 4 75	22.0	10	3.64	5.5	1.12	0.	6.3	131	4.9	22.4	27.5	5.0	8.6	23.2
31005	1	27 2 67	17.3	18	22.98	52.0	2.90	0.	1.0	126	7.6	44.1	*	*	*	*
31005	2	25 11 68	16.5	22	20.33	49.3	2.28	0.	0.8	125	9.2	56.5	*	*	*	*
31005	5	11 3 69	27.8	42	39.51	44.3	3.89	4.3	0.5	121	16.2	58.2	5.7	42.0	46.4	103.3
31005	6	9 1 70	9.4	24	16.03	44.3	1.85	40.0	4.1	89	8.5	90.8	*	*	*	*
31005	7	22 1 71	26.3	22	33.46	37.9	4.47	24.2	2.1	102	11.2	42.4	*	*	*	*
31005	8	5 12 72	20.3	14	22.93	25.9	3.29	47.7	5.0	82	5.6	27.7	8.2	26.5	26.5	83.4
31005	9	19 11 74	22.0	26	32.33	41.1	6.46	1.7	7.0	130	9.2	42.0	*	*	*	*
31005	10	[illegible] 3 75	39.7	[illegible]	104.47	[illegible]	[illegible]	0.	3.4	[illegible]	[illegible]	73.0	*	*	*	*
31010	1	10 7 63	72.8	22	20.93	14.3	0.55	60.0	2.4	67	16.8	23.1	*	*	*	*
31010	2	1 11 68	26.0	15	12.39	15.7	1.07	0.	5.7	130	10.6	40.9	*	*	*	*
31010	3	5 5 69	38.8	11	16.26	12.8	0.77	27.7	0.3	97	12.4	32.1	*	*	*	*
31010	5	6 12 72	16.3	7	5.61	18.7	0.67	38.5	6.7	93	5.7	35.2	*	*	*	*
31010	6	20 11 74	19.9	24	7.60	17.3	1.13	2.6	4.6	127	8.8	44.3	14.2	14.1	13.4	51.5
31010	7	8 3 75	32.9	23	15.63	12.6	0.79	0.	3.0	127	14.2	43.1	*	*	*	*
31010	8	18 4 75	22.2	15	15.02	11.9	1.73	0.	5.0	129	11.3	51.1	*	*	*	*
31021	4	1 12 72	27.0	21	15.20	16.0	1.01	59.8	3.1	68	6.1	22.6	*	*	*	*
31021	6	19 6 73	52.0	21	13.88	13.2	0.49	86.8	0.	38	3.7	7.0	*	*	*	*
31023	2	21 7 73	20.3	14	1.17	3.5	0.06	35.9	4.8	93	5.1	25.2	39.5	4.3	5.9	16.3
32801	1	13 10 66	19.4	9	1.60	5.4	0.19	4.8	5.5	125	6.0	30.7	35.7	4.4	5.5	20.2
32801	2	1 12 66	9.2	10	1.14	2.6	0.28	0.	4.8	129	3.9	42.9	40.5	5.4	6.8	14.0
32801	3	9 12 66	21.8	16	2.51	5.5	0.19	0.	3.7	128	14.5	66.6	28.6	5.6	7.7	23.3
32801	5	9 7 68	71.9	26	2.92	9.3	0.08	28.8	1.2	97	19.3	26.8	25.9	6.4	9.1	24.8
32801	6	1 11 68	29.2	16	3.06	5.2	0.16	0.	3.3	128	13.1	44.9	36.1	4.3	5.3	20.1
32801	7	15 1 69	9.7	7	1.21	2.1	0.24	0.	1.9	126	3.2	32.8	64.7	2.8	3.3	10.6
32801	9	5 5 69	30.4	13	1.25	5.0	0.09	33.7	0.1	91	4.9	16.0	36.5	3.8	5.8	18.9
32801	10	30 5 69	26.7	13	4.27	6.8	0.16	3.2	2.7	124	13.7	51.3	46.0	3.6	4.5	15.1
33014	1	27 2 61	17.0	31	7.21	23.0	2.21	0.4	1.4	125	3.0	17.7	7.8	22.4	28.8	34.2
33014	3	20 1 62	13.4	34	6.16	22.4	2.30	0.	1.0	125	1.5	11.0	*	*	*	*
33014	5	8 12 65	18.5	25	7.10	28.0	1.14	0.	1.9	126	2.9	15.8	*	*	*	*
33014	6	30 12 66	11.8	11	6.05	24.4	2.24	0.	3.6	128	1.3	11.2	*	*	*	*
33014	7	5 11 67	18.8	14	6.11	25.0	2.17	23.2	9.1	110	1.4	7.3	11.0	25.9	21.5	58.1
33014	8	4 1 68	10.2	12	5.17	23.3	1.39	0.	0.9	125	1.7	16.8	8.5	25.5	26.5	77.8
33014	11	17 12 68	14.8	12	6.78	22.8	1.15	0.	1.8	126	2.5	16.6	*	*	*	*
33014	12	22 1 69	11.9	8	8.95	23.2	2.96	0.	1.9	126	2.2	18.2	*	*	*	*
33014	15	5 5 69	35.4	10	8.94	20.4	1.95	10.1	0.0	114	2.9	8.3	*	*	*	*
33015	7	17 11 63	46.9	53	16.16	20.8	1.03	46.7	0.6	78	11.4	24.3	7.0	23.5	41.0	75.9
33015	8	23 11 63	18.6	21	12.14	17.8	1.96	9.2	0.9	116	5.8	31.1	8.7	14.2	27.0	73.8
33015	11	24 9 65	41.0	43	11.24	30.6	0.65	48.2	0.3	77	7.5	18.4	6.7	33.2	37.5	91.0
33015	13	22 12 65	15.9	18	14.42	16.6	3.15	0.	1.1	126	6.0	37.8	*	*	*	*
33015	15	18 4 66	17.4	38	14.10	21.5	2.90	1.4	2.8	126	7.9	45.5	7.4	21.8	28.9	92.5
33015	16	1 10 66	28.8	54	14.77	27.3	3.40	12.0	12.8	125	10.3	35.8	*	*	*	*
33015	17	13 10 66	27.6	29	14.57	19.3	2.34	0.1	1.1	125	8.7	31.7	7.6	18.0	33.5	79.3
33015	18	9 12 66	15.4	9	16.16	21.9	2.96	0.	1.7	126	6.8	44.3	7.9	15.8	35.2	70.4
33015	19	27 2 67	16.0	17	14.67	19.0	2.42	0.	2.5	127	6.4	40.0	8.5	15.0	31.5	67.8
33015	21	1 11 68	15.3	11	16.38	16.6	2.59	0.	1.8	126	5.5	36.0	10.0	13.0	26.0	59.2
33029	1	8 12 65	25.7	39	3.53	10.2	0.97	0.2	2.4	127	2.6	10.2	12.0	6.5	21.2	50.3
33029	2	19 2 66	19.6	16	3.79	10.9	1.76	0.	6.6	131	2.2	11.1	13.3	10.2	14.9	53.8
33029	3	29 8 66	51.6	29	1.90	18.9	0.07	65.3	0.8	60	1.6	3.1	12.5	14.8	20.0	49.0
33029	4	27 5 67	23.7	10	2.81	8.4	0.65	11.8	2.3	112	1.8	7.4	*	*	*	*
33029	5	5 11 67	20.3	12	2.07	7.9	0.46	35.9	4.5	93	1.2	5.8	16.3	7.6	15.2	37.8
33029	6	13 7 68	14.4	15	1.50	10.6	0.26	24.4	4.5	105	1.2	8.1	12.5	13.2	21.2	46.6
33029	8	5 5 69	20.9	9	2.04	9.0	0.60	15.6	0.	109	1.1	5.1	*	*	*	*
33045	1	16 10 67	15.4	18	0.16	13.3	0.06	86.1	4.3	43	0.5	3.1	*	*	*	*
33045	2	5 11 67	14.9	13	0.34	18.6	0.33	22.8	7.2	109	1.9	12.9	9.4	19.4	24.1	70.1
33045	4	8 8 68	24.2	8	0.46	20.0	0.10	37.2	7.7	95	1.9	7.8	7.5	17.4	33.5	81.3
33045	5	15 8 68	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

CATCH NO	EV NO	DATE OF STORM	RAINFALL TOTAL (MM)	RAINFALL DURN (H)	PEAK FLOW (CUMECS)	LAG (H)	ANSF (CUMECS)	SMD (MM)	APIS (MM)	CWI (MM)	RUNOFF (MM)	RUNOFF %	1-HOUR UNIT HYDROGRAPH UH PEAK (CUMECS PER 100 SQ KMS.)	TIME TO PEAK (H)	WIDTH AT 0.5 PEAK (H)	UH TIME BASE (H)
33045	12	26 1 72	30.9	38	1.33	19.6	0.39	0.	3.7	128	6.5	21.0	6.9	22.8	38.0	85.2
33809	12	13 5 67	30.8	44	8.59	14.2	0.18	8.7	5.0	121	15.6	50.8	12.5	16.0	19.0	51.0
33809	14	9 7 68	80.0	28	11.42	19.4	0.30	53.2	3.1	74	24.5	30.6	7.9	25.0	27.7	85.4
33809	15	13 7 68	21.6	28	5.87	18.3	0.30	4.0	12.2	133	10.7	49.5	9.8	13.6	25.0	63.5
33809	16	7 8 68	40.4	31	16.11	17.4	1.66	22.0	4.3	107	29.5	73.1	8.9	18.3	23.4	78.1
33809	17	15 9 68	34.9	32	8.24	26.6	0.08	3.8	1.1	122	17.8	51.0	*	*	*	*
33809	18	1 11 68	22.1	21	6.35	16.6	0.19	0.3	2.9	127	9.9	44.6	12.0	19.0	22.0	48.7
33809	19	15 1 69	22.3	12	10.93	17.2	0.58	0.	3.2	128	14.9	66.9	13.0	15.1	22.0	41.5
33809	21	17 5 69	21.8	32	7.23	14.7	0.56	2.4	5.5	128	9.6	44.1	16.2	26.8	18.2	32.2
33809	22	16 7 68	14.5	15	7.46	15.0	0.49	1.6	5.8	129	11.9	82.1	10.0	15.4	25.3	60.6
34003	1	8 12 65	34.4	32	8.86	24.2	1.70	0.	3.1	128	5.8	16.9	*	*	*	*
34003	2	18 2 66	25.2	38	4.49	17.9	1.54	1.1	0.0	123	3.2	12.6	*	*	*	*
34003	4	15 9 68	60.9	43	9.27	25.8	1.12	4.5	1.4	121	8.2	13.5	*	*	*	*
34003	5	11 3 69	22.9	38	4.55	18.9	1.61	[illegible]	0.	120	2.2	9.5	10.0	13.6	21.6	68.0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	127	[illegible]	[illegible]	*	*	*	*
34003	9	12 4 70	18.6	16	5.30	11.3	1.70	[illegible]	[illegible]	120	1.7	8.9	15.3	9.6	14.6	43.5
34003	10	14 11 70	33.5	19	5.02	12.3	1.00	[illegible]	[illegible]	70	2.1	6.2	14.6	10.6	16.4	43.4
34003	11	22 1 71	29.9	23	9.27	19.0	1.70	[illegible]	[illegible]	130	4.5	15.1	13.0	14.3	17.8	49.9
34003	12	26 1 72	35.6	32	8.16	18.7	1.38	[illegible]	2.6	127	5.6	15.6	11.2	18.5	20.8	57.7
34005	2	8 12 65	36.1	38	4.96	26.7	0.74	0.1	1.7	126	9.1	25.3	6.7	23.0	42.5	81.0
34005	3	7 2 66	24.1	29	3.26	29.1	0.43	0.	2.9	127	5.6	23.1	8.7	25.1	28.1	71.6
34005	4	19 2 66	15.2	16	3.30	22.2	1.24	1.1	5.6	129	3.3	21.4	10.2	23.7	25.7	57.6
34005	6	15 9 68	52.1	42	3.95	37.0	0.27	4.1	1.7	122	11.6	18.5	*	*	*	*
34005	7	1 11 68	10.7	9	2.95	21.1	0.38	0.	2.6	127	3.3	31.3	*	*	*	*
34005	8	12 3 69	22.7	21	2.92	24.2	0.60	2.8	1.7	123	4.7	21.5	8.0	22.6	27.7	83.6
34005	9	22 1 71	30.5	21	4.02	26.4	0.54	0.	5.9	130	7.4	24.3	7.9	25.1	30.0	80.8
34007	1	9 12 66	14.7	17	9.07	20.6	1.71	0.	2.5	127	6.1	41.4	*	*	*	*
34007	2	23 12 66	11.6	22	4.58	12.7	1.09	0.	0.4	125	3.1	27.1	*	*	*	*
34007	4	15 9 68	71.9	21	38.45	[illegible]	1.02	80.4	5.4	50	38.3	53.2	*	*	*	*
34007	5	20 12 68	21.3	44	7.42	[illegible]	1.10	5.6	1.6	120	9.1	42.9	*	*	*	*
34007	9	5 5 69	27.2	17	10.32	[illegible]	0.65	22.8	0.3	102	6.3	30.6	*	*	*	*
34011	1	16 11 66	21.2	14	3.20	15.4	1.17	0.	4.8	129	1.8	8.6	12.0	13.2	16.6	59.5
34011	2	27 2 67	17.3	15	3.13	13.0	1.29	0.	0.6	125	1.5	8.6	12.0	10.2	20.0	52.7
34011	3	27 5 67	20.2	11	4.55	9.5	1.26	4.1	1.8	122	2.3	11.6	14.8	9.0	17.1	40.9
34011	6	15 9 68	48.9	43	4.54	46.0	0.61	4.1	3.5	124	8.4	17.1	*	*	*	*
34011	7	22 1 71	28.7	22	4.46	20.6	1.06	0.	1.8	126	4.1	14.3	*	*	*	*
35008	3	[illegible] 12 66	[illegible]	11	[illegible]	[illegible]	1.59	[illegible]	2.0	127	5.8	49.8	14.9	16.2	15.0	44.6
35008	4	5 11 67	15.3	13	9.10	9.0	1.48	26.5	8.3	106	3.6	23.7	*	*	*	*
35008	5	4 1 68	11.7	20	7.42	12.3	1.17	0.	1.0	125	4.3	36.4	12.7	12.8	19.3	49.0
35008	7	14 9 68	60.3	53	23.84	13.4	0.59	56.2	3.3	72	22.5	37.4	*	*	*	*
35008	8	1 11 68	12.3	7	11.02	8.1	1.57	22.0	3.4	106	4.5	36.3	19.6	7.0	12.4	31.9
35008	9	17 12 68	12.2	9	7.10	10.0	1.14	10.4	3.2	117	3.2	25.9	*	*	*	*
35008	10	22 1 69	13.2	6	14.05	11.0	2.00	0.	2.8	127	6.6	50.2	17.5	9.3	12.5	38.5
35008	12	11 3 69	25.9	40	18.86	13.9	0.96	3.4	2.7	124	[illegible]	60.8	14.3	8.2	15.9	46.0
35008	13	5 5 69	34.2	10	23.54	13.7	0.65	27.6	0.2	97	[illegible]	[illegible]	15.4	12.3	15.6	41.0
35008	14	26 1 72	23.9	26	21.78	15.1	1.65	0.	2.7	127	15.6	65.1	16.1	12.2	12.9	43.3
36008	1	20 1 62	15.6	33	12.58	29.2	2.12	0.6	1.9	126	7.2	46.2	9.7	30.1	25.0	64.6
36008	2	4 4 62	17.8	33	10.53	24.7	0.76	0.2	3.1	127	6.4	35.8	8.4	17.8	28.0	76.4
36008	4	30 4 63	16.5	16	9.31	20.0	0.90	13.9	4.0	115	4.5	27.1	*	*	*	*
36008	5	17 11 63	40.8	50	20.79	32.9	0.43	49.6	0.2	75	18.4	45.0	6.8	31.0	40.0	83.5
36008	6	13 3 64	38.9	45	22.04	32.5	0.47	9.6	1.3	116	18.9	48.5	*	*	*	*
36008	7	8 12 65	17.7	31	13.98	26.3	1.48	31.1	1.0	94	8.7	49.0	*	*	*	*
36008	8	15 12 65	21.1	49	14.56	15.2	4.00	16.8	0.6	108	9.8	46.5	10.0	23.6	30.0	51.2
36008	9	9 12 66	16.1	20	12.54	25.9	1.59	8.6	2.3	118	7.0	43.3	7.2	27.0	34.5	85.4
36008	10	30 12 66	11.0	10	11.18	17.8	2.48	0.	2.2	127	5.0	45.2	9.3	18.1	24.5	70.6
36008	14	16 12 68	14.2	14	13.06	20.8	1.15	7.3	1.9	119	6.8	47.7	9.3	20.0	26.0	67.6
36008	17	11 3 69	28.5	42	23.72	26.7	0.86	0.	3.1	128	17.1	59.9	9.4	29.2	25.6	67.1
36008	18	5 5 69	27.4	11	13.26	15.3	0.86	42.0	0.	83	6.0	21.9	10.6	12.6	23.7	57.5
37001	1	19 9 60	22.5	32	21.13	20.2	0.96	38.1	4.5	91	9.4	41.7	*	*	*	*
37001	2	3 12 60	22.9	22	37.25	25.3	2.47	0.	3.8	128	13.2	57.8	10.4	28.2	25.2	56.5
37001	3	27 2 61	21.1	35	20.12	23.0	2.13	0.	4.5	129	9.5	45.2	7.0	32.4	37.8	83.3
37001	4	21 1 62	19.2	[illegible]	25.55	26.3	4.33	0.	5.9	130	9.6	53.0	*	*	*	*
37001	5	9 3 63	[illegible]	[illegible]	13.46	32.3	2.64	7.5	1.4	118	4.7	40.8	*	*	*	*
37001	6	17 11 63	41.1	43	27.50	25.1	1.38	20.4	1.3	105	20.2	49.2	*	*	*	*
37001	7	27 1 64	12.2	21	17.72	30.0	1.65	1.0	0.	123	7.5	61.9	*	*	*	*
37001	9	2 9 65	37.8	27	8.21	18.7	0.28	84.4	0.9	41	4.1	10.9	6.6	37.3	31.4	105.7
37001	10	8 12 65	21.9	29	24.49	23.6	2.78	0.2	1.3	126	10.0	45.6	8.3	33.5	29.5	75.0
37001	12	17 4 66	27.8	66	23.12	25.8	2.64	3.1	3.6	125	13.5	48.4	8.9	39.0	25.0	74.9
37001	13	27 2 67	15.6	25	20.33	24.4	2.91	0.	3.6	128	9.0	57.4	8.2	26.5	29.8	76.0
37001	15	16 12 68	29.1	14	32.32	15.7	3.59	0.	4.0	129	13.0	44.5	*	*	*	*
37001	16	15 9 68	45.7	47	15.43	21.9	0.65	85.1	8.5	48	13.1	28.7	*	*	*	*
37003	1	13 3 64	45.4	46	7.23	23.0	0.24	6.3	0.4	119	13.8	30.5	*	*	*	*
37003	2	2 9 65	54.5	25	3.10	20.0	0.06	75.2	0.5	50	4.4	8.0	*	*	*	*
37003	3	8 12 65	18.5	27	5.32	21.8	0.51	0.	1.7	126	7.4	40.2	*	*	*	*
37003	4	18 4 66	21.8	40	5.01	24.0	0.43	3.3	3.0	124	8.3	38.2	*	*	*	*
37003	9	11 3 69	27.9	53	9.27	14.6	1.72	0.	5.8	130	14.7	52.9	*	*	*	*
37007	1	2 9 65	59.3	25	7.90	20.0	0.05	100.0	0.4	25	5.9	10.0	12.0	17.0	21.0	50.7
37007	2	8 12 65	21.4	28	16.48	17.6	1.34	0.	1.6	126	10.0	46.7	15.0	13.8	15.5	43.1
37007	3	9 2 66	13.0	26	11.32	14.8	1.93	0.	2.3	127	6.3	48.4	13.6	12.5	17.5	46.8
37007	6	28 12 66	11.6	10	10.90	12.9	2.01	0.	2.2	127	7.4	46.5	16.0	10.4	15.5	38.5
37007	7	27 2 67	18.0	23	13.05	15.2	1.41	0.	3.3	128	7.8	43.2	13.6	15.0	18.5	44.8
37007	9	14 9 68	35.2	47	14.88	20.2	3.24	44.7	13.4	93	8.6	24.4	*	*	*	*
37007	12	10 3 69	18.8	10	12.31	13.2	0.73	6.3	0.	118	6.5	34.3	15.5	14.6	15.0	41.7
37008	1	8 12 65	19.1	27	13.62	27.4	1.58	0.	1.5	126	6.3	32.9	*	*	*	*
37008	4	14 9 68	42.5	56	14.79	35.9	1.65	47.4	4.4	82	10.3	24.3	*	*	*	*
37331	2	22 10 66	18.0	9	5.62	7.3	0.22	55.0	4.0	74	2.7	14.9	*	*	*	*

CATCH NO	EV NO	DATE OF STORM	RAINFALL TOTAL (MM)	RAINFALL DURN (H)	PEAK FLOW (CUMECS)	LAG (H)	ANSF (CUMECS)	SMD (MM)	APIS (MM)	CWI (MM)	RUNOFF (MM)	RUNOFF %	1-HOUR UNIT HYDROGRAPH: UH PEAK (CUMECS PER 100 SQ KMS)	TIME TO PEAK (H)	WIDTH AT 0.5 PEAK (H)	UH TIME BASE (H)
37331	6	20 2 67	10.2	12	6.48	4.3	0.58	0.	2.6	127	2.8	27.1	*	*	*	*
37331	7	27 2 67	12.5	17	8.16	5.8	0.61	0.	3.4	128	4.1	33.0	*	*	*	*
37331	9	9 4 67	19.9	10	5.84	6.3	0.23	14.5	1.0	111	2.5	12.3	*	*	*	*
37331	11	18 12 67	18.4	13	7.45	7.1	0.29	9.6	0.3	115	4.4	23.9	*	*	*	*
37331	13	8 4 68	13.0	9	4.76	7.6	0.20	41.1	7.0	50	2.6	19.6	*	*	*	*
38003	1	2 5 61	8.4	6	1.64	4.3	0.98	4.7	1.3	121	0.1	[illegible]	*	*	*	*
38003	2	12 6 61	27.6	19	1.65	5.9	0.79	81.3	0.	43	0.2	0.9	37.2	4.9	6.0	17.9
38003	3	6 7 67	25.7	10	1.69	5.9	0.52	34.1	1.9	92	0.3	1.0	48.0	4.8	4.8	13.6
38003	6	25 6 67	30.0	5	2.56	3.5	0.72	51.3	8.1	81	0.3	1.0	*	*	*	*
38003	7	22 7 67	25.3	[illegible]	2.18	4.0	0.63	88.4	0.7	37	0.2	0.9	*	*	*	*
38003	9	15 9 68	63.6	15	3.61	3.1	0.48	37.0	5.8	93	1.0	1.5	*	*	*	*
38007	1	26 6 58	39.1	24	13.27	5.5	0.32	14.2	5.6	116	18.7	47.7	32.3	3.6	6.9	20.7
38007	2	1 7 58	36.1	30	14.04	5.6	0.26	6.3	2.0	120	20.5	56.7	35.0	3.6	6.7	18.4
38007	3	19 9 60	21.4	15	8.57	3.0	0.25	44.4	4.4	85	11.7	54.8	44.2	4.4	5.1	15.0
38007	4	8 10 60	18.6	11	6.88	4.4	0.50	9.6	4.3	119	10.2	54.9	35.5	4.9	6.6	18.0
38007	5	30 10 60	14.2	6	7.61	3.7	0.76	0.	10.3	135	7.5	52.5	47.8	3.6	4.9	13.4
38007	6	25 11 60	15.9	9	7.17	4.1	0.67	0.	5.2	130	10.5	66.2	39.5	5.8	5.2	17.7
38007	9	13 7 62	13.3	6	2.19	4.4	0.09	106.3	2.5	21	1.4	10.4	*	*	*	*
38007	11	31 8 63	15.1	9	2.60	1.8	0.06	62.9	1.4	63	1.3	8.6	67.0	2.3	3.0	10.5
38007	12	17 11 63	13.3	7	2.60	5.5	0.21	0.	1.0	126	3.4	25.3	37.6	5.4	5.2	18.9
38007	14	21 7 64	39.4	4	8.46	3.3	0.27	66.8	1.3	59	7.0	17.7	*	*	*	*
38007	15	19 7 65	22.6	8	5.89	2.5	0.21	82.1	0.5	43	2.3	10.3	*	*	*	*
38007	16	17 11 65	11.3	7	3.84	2.9	0.37	23.4	3.4	105	2.9	25.9	55.2	3.2	4.0	12.1
38007	18	22 6 66	33.5	6	4.08	2.4	0.34	75.5	0.5	50	4.4	13.3	37.0	2.7	3.1	23.9
38007	19	27 2 67	14.4	12	4.34	4.8	0.46	0.	3.7	128	6.0	55.3	28.7	3.3	6.4	26.0
38007	20	25 6 67	25.6	5	4.37	1.7	0.20	58.5	2.3	68	2.7	10.4	70.0	2.3	3.6	8.7
38007	22	13 7 68	25.8	7	7.60	2.1	0.31	68.4	1.8	58	4.8	18.7	59.9	3.6	4.3	10.0
38007	23	7 10 68	[illegible]	22	6.27	3.0	0.19	7.9	0.1	117	7.7	36.4	34.6	3.3	6.5	19.1
38007	24	28 10 68	15.1	8	4.85	2.6	0.35	15.9	0.7	109	3.1	20.9	54.9	3.4	5.2	9.9
39004	6	16 6 65	12.8	9	1.53	1.6	0.01	71.4	1.2	54	0.1	0.8	145.7	1.8	1.8	4.1
39004	7	7 7 65	10.1	11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
39004	8	22 7 65	15.2	12	1.73	2.2	0.01	88.1	6.5	43	0.2	1.4	*	*	*	*
39004	9	2 9 65	18.0	10	2.37	1.9	0.07	95.5	1.7	31	0.2	1.0	82.2	3.3	3.3	7.0
39004	10	3 9 65	58.4	14	3.72	2.3	0.08	82.7	14.2	56	0.8	1.3	56.6	1.8	3.0	13.6
39004	11	19 11 65	19.0	13	2.02	2.2	0.01	4.9	2.7	122	0.2	1.1	100.3	1.8	2.3	6.4
39004	12	28 11 65	27.3	18	2.47	3.8	0.01	0.	1.7	126	0.4	1.4	77.9	2.4	2.8	8.7
39004	13	22 6 66	29.1	6	3.07	1.8	0.13	82.7	[illegible]	43	0.3	1.1	*	*	*	*
39004	14	25 6 67	[illegible]	7	[illegible]	[illegible]	0.29	50.6	9.1	[illegible]	0.4	1.3	91.3	1.3	2.5	7.3
39004	15	22 7 67	20.4	7	2.96	2.2	0.19	91.2	0.6	34	0.3	1.6	*	*	*	*
39004	16	1 11 67	20.7	7	2.34	1.7	0.17	0.8	9.1	133	0.4	1.7	75.1	1.5	2.6	9.6
39004	17	17 4 68	9.3	2	3.06	0.8	0.25	8.0	2.4	119	0.1	1.1	*	*	*	*
39004	18	4 5 68	13.9	9	2.65	2.2	0.18	7.5	0.4	117	0.2	1.3	102.9	1.8	2.1	6.6
39004	19	18 5 68	16.3	14	2.86	0.5	0.19	7.3	3.9	121	0.3	1.7	*	*	*	*
39004	20	13 7 68	17.6	6	3.52	2.3	[illegible]	35.3	2.2	91	0.2	1.3	95.9	2.0	2.5	6.5
39004	21	28 8 68	16.4	4	3.94	1.3	0.23	56.4	2.2	70	0.2	1.1	138.6	2.0	1.7	4.6
39004	22	14 7 68	[illegible]	32	[illegible]	[illegible]	0.29	38.8	2.4	88	2.1	1.7	*	*	*	*
39004	24	6 7 69	30.0	20	3.92	[illegible]	0.13	101.0	0.4	24	0.7	1.5	*	*	*	*
39004	25	28 7 69	39.6	15	3.92	[illegible]	0.13	108.3	0.1	16	0.5	1.2	108.8	1.3	2.1	6.0
39004	26	2 8 69	27.4	9	4.33	[illegible]	0.14	81.2	4.3	48	0.3	1.1	*	*	*	*
39004	27	5 8 70	15.9	5	5.53	2.7	0.13	144.2	1.3	-17	0.4	2.5	*	*	*	*
39004	28	13 11 70	30.6	10	4.30	2.5	0.04	79.8	3.4	48	0.5	1.7	64.6	2.1	3.6	9.9
39005	2	25 7 62	28.3	12	12.97	3.9	0.34	107.3	2.7	20	3.9	13.7	39.1	2.9	5.1	22.3
39005	3	30 4 63	15.3	16	3.95	4.7	0.35	8.5	3.0	119	2.5	16.1	48.7	3.1	4.1	14.6
39005	4	5 9 63	13.5	6	4.28	4.9	0.35	76.2	7.4	56	1.9	14.3	63.9	4.2	3.4	10.6
39005	5	[illegible] 10 63	10.4	9	4.44	2.5	0.28	92.0	[illegible]	33	1.3	12.9	66.6	[illegible]	[illegible]	[illegible]
39005	6	17 11 63	[illegible]	7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2.7	22.8	53.2	2.6	4.1	[illegible]
39005	7	16 4 64	12.4	7	6.24	2.4	0.62	9.4	2.6	118	2.2	17.6	90.9	3.1	2.2	[illegible]
39005	8	20 4 64	15.4	10	11.82	3.3	1.48	0.	6.6	131	5.2	33.9	48.8	3.4	4.1	14.6
39005	9	1 6 64	23.0	8	12.13	2.7	0.70	13.6	12.0	123	5.4	23.5	51.7	2.8	4.4	12.7
39005	10	13 6 64	9.5	2	9.98	1.8	0.91	3.1	6.5	128	2.5	26.3	*	*	*	*
39005	11	21 7 64	23.2	2	14.53	4.1	0.50	97.2	0.2	28	4.1	17.6	*	*	*	*
39005	14	22 6 66	26.3	8	9.72	3.7	0.80	82.6	0.6	43	3.7	14.2	75.7	3.6	3.1	8.5
39005	15	19 7 66	19.8	10	12.32	3.9	0.98	124.8	5.2	5	4.6	23.0	55.8	2.8	3.2	13.5
39005	16	29 8 66	26.5	10	14.33	2.9	1.10	89.5	6.7	42	6.3	23.9	45.5	3.1	5.3	13.7
39005	17	25 6 67	27.3	5	12.97	1.9	0.36	51.0	7.8	81	4.6	16.8	66.7	2.6	2.9	10.9
39005	18	18 8 67	21.5	10	9.22	2.0	0.46	101.3	1.9	25	3.6	16.6	*	*	*	*
39005	21	6 7 69	41.1	23	10.85	5.7	0.29	100.3	0.1	24	8.2	19.8	46.1	5.9	4.9	14.3
39005	22	28 7 69	36.2	16	9.32	4.3	0.09	108.4	[illegible]	16	5.7	15.7	35.3	2.0	3.4	13.2
39007	1	22 1 71	14.2	25	21.38	15.1	8.71	0.	8.6	133	2.7	19.1	*	*	*	*
39007	2	14 3 71	19.2	13	13.95	11.9	3.04	4.8	0.4	120	2.4	13.0	15.8	10.8	13.1	44.2
39007	3	17 3 71	23.5	23	20.33	12.6	3.96	0.6	3.8	128	5.3	22.6	11.6	10.2	21.1	53.7
39007	4	22 4 71	31.4	31	21.85	21.2	3.00	27.1	0.2	98	5.6	18.0	14.7	13.5	13.3	49.0
39007	5	25 4 71	16.2	13	20.13	13.5	3.44	8.5	9.6	126	3.6	22.3	*	*	*	*
39007	6	10 6 71	47.7	20	26.23	26.6	2.02	41.4	7.4	91	9.2	19.2	*	*	*	*
39007	7	13 6 71	31.4	29	23.83	22.7	4.26	13.8	8.2	119	7.4	23.6	*	*	*	*
39007	8	18 6 71	35.5	40	25.41	24.0	3.52	6.3	2.3	120	9.2	25.7	9.3	16.0	25.5	[illegible]
39007	9	13 11 74	33.8	24	27.47	24.4	1.86	37.3	5.3	92	12.4	36.6	8.3	10.1	15.6	102.8
39007	10	20 11 74	41.5	37	31.46	21.6	9.74	0.	5.1	133	9.9	23.8	7.2	13.5	43.3	67.8
39007	11	18 1 75	20.9	9	25.46	15.8	4.89	0.	3.8	128	[illegible]	28.3	13.0	15.0	19.3	46.9
39007	12	19 1 75	21.3	18	25.77	16.8	6.28	0.	12.3	137	6.1	28.5	11.3	11.3	23.4	51.6
39007	13	18 4 75	15.6	10	24.31	13.5	4.99	1.3	2.7	126	3.6	20.3	16.0	13.0	14.0	41.5
39012	1	7 8 60	31.7	4	15.81	3.2	0.78	90.8	0.1	34	5.0	15.7	46.5	3.0	5.1	13.7
39012	3	20 4 64	24.3	18	14.66	2.0	1.87	0.	5.5	130	5.7	23.4	*	*	*	*
39012	4	31 5 64	23.4	9	11.31	3.1	1.25	12.8	6.9	119	3.4	14.7	43.5	4.2	5.4	14.9
39012	5	21 7 64	24.6	[illegible]	10.13	3.0	1.10	57.3	0.1	67	2.1	8.7	*	*	*	*
39012	6	3 9 65	39.8	[illegible]	13.11	5.0	1.67	93.0	11.0	43	4.7	11.7	*	*	*	*
39012	7	28 11 65	25.0	[illegible]	12.23	4.8	(0.93)	0.	1.7	126	6.3	24.2	25.5	4.0	6.7	30.2
39012	8	22 6 66	28.9	9	11.18	4.6	1.15	70.6	2.3	56	2.8	9.7	51.6	3.9	4.5	12.6
39012	9	17 5 68	24.3	23	14.07	6.3	1.13	6.8	0.7	118	5.2	21.5	*	*	*	*
39012	10	14 9 68	102.0	33	22.70	5.3	1.38	62.0	1.5	64	20.9	20.5	18.8	5.3	13.6	31.9
39012	11	28 7 69	40.5	16	9.50	6.5	0.35	125.9	0.	0	3.9	9.8	37.0	4.5	6.3	17.5
39012	12	2 8 69	31.5	10	11.98	3.4	0.86	81.2	3.1	46	3.9	12.3	*	*	*	*
39017	2	17 11 63	34.8	36	7.36	3.8	1.40	0.	6.8	131	17.3	49.8	25.0	8.4	9.5	25.5
39017	3	28 11 63	15.9	23	3.47	7.2	0.18	0.1	0.6	125	9.1	57.0	21.2	9.0	9.8	32.9
39017	6	25 3 64	13.3	26	2.94	8.2	0.14	0.	1.2	126	7.8	58.9	24.0	10.0	8.6	29.1

CATCH NO	EV NO	DATE OF STORM	RAINFALL TOTAL (MM)	RAINFALL DURN (H)	PEAK FLOW (CUMECS)	LAG (H)	ANSF (CUMECS)	SMD (MM)	APIS (MM)	CWI (MM)	RUNOFF (MM)	RUNOFF %	1-HOUR UNIT HYDROGRAPH: UH PEAK (CUMECS PER 100 SQ KMS)	TIME TO PEAK (H)	WIDTH AT 0.5 PEAK (H)	UH TIME BASE (H)
39017	9	15 4 64	12.4	27	1.80	15.5	0.12	10.0	4.1	119	5.2	41.9	20.0	9.0	11.2	33.2
39017	11	21 7 64	66.4	24	5.29	7.9	0.02	74.1	0.7	51	10.4	15.7	28.5	9.5	8.3	22.4
39017	20	24 9 65	37.2	43	2.64	12.5	0.04	86.8	0.	38	9.4	25.4	*	*	*	*
39017	31	22 12 65	19.3	45	3.35	9.7	0.15	6.0	0.3	119	13.3	67.3	20.0	10.4	13.0	[illegible]
39017	33	31 12 65	9.8	13	2.25	11.6	0.27	0.	3.7	128	6.9	70.4	18.2	10.4	13.5	34.1
39017	40	19 2 66	18.4	37	3.43	13.8	0.11	0.	5.4	130	14.9	81.0	17.9	8.8	11.0	40.1
39017	49	11 5 66	22.5	32	5.31	9.7	0.07	4.9	1.3	121	11.6	51.6	23.6	9.3	9.0	29.1
39017	53	12 10 66	39.2	46	5.41	14.1	0.12	13.3	1.0	112	25.2	64.3	19.3	9.4	10.6	36.4
39017	55	9 12 66	18.6	15	5.62	8.4	0.24	0.	2.0	127	12.0	64.8	24.8	10.1	8.6	27.6
39017	61	17 1 69	9.5	16	2.23	7.5	0.22	0.	2.6	127	6.2	65.1	20.0	9.8	12.0	31.6
39017	62	22 1 69	11.1	5	3.36	9.0	0.26	0.	2.3	127	[illegible]	50.3	24.5	8.9	10.0	25.4
39017	63	12 3 69	21.0	23	5.64	7.0	0.54	0.	6.9	131	13.0	61.8	*	*	*	*
39017	64	16 5 69	27.6	13	7.11	11.6	0.07	32.3	3.5	96	13.6	49.2	26.0	9.0	8.9	25.0
39017	66	24 4 70	37.4	34	6.37	15.7	0.07	6.3	0.7	119	19.6	52.3	17.6	9.5	13.0	37.2
39017	67	22 1 71	18.2	29	3.04	9.4	0.34	4.1	5.1	125	11.3	61.9	21.4	9.0	9.8	32.4
39017	68	29 1 71	29.6	35	5.44	10.2	0.21	0.	1.2	126	18.6	62.9	19.5	8.9	12.7	31.6
39017	70	18 12 67	15.7	14	3.60	10.0	0.09	0.2	0.6	125	9.8	52.2	24.2	9.5	10.2	25.6
39017	71	[illegible] 7 68	82.6	26	16.10	5.6	0.17	75.9	4.3	53	36.8	44.6	24.8	7.1	9.2	26.4
39017	72	15 9 68	25.6	25	2.86	17.6	0.05	41.0	8.0	91	15.2	53.0	*	*	*	*
39017	73	1 11 68	26.1	10	9.10	7.5	0.23	1.6	4.4	127	17.3	66.3	30.0	6.5	8.4	20.3
39017	74	21 12 68	9.5	6	3.83	9.4	0.41	0.	0.0	125	6.0	63.7	26.0	11.0	10.0	22.8
39017	75	17 7 75	51.5	3	0.20	10.0	0.02	134.6	0.7	-8	0.2	0.3	*	*	*	*
39022	1	28 11 65	31.5	19	17.50	23.3	2.40	3.3	1.9	123	10.7	34.1	9.6	25.8	24.5	66.8
39022	2	8 12 65	18.7	26	13.41	19.4	2.98	0.1	1.1	126	6.6	35.3	11.4	17.0	20.2	57.1
39022	3	8 2 66	25.2	39	15.07	21.4	3.37	0.	4.3	129	10.1	40.0	11.7	20.0	21.4	52.2
39022	10	28 11 70	18.8	11	18.48	16.0	2.91	13.8	2.1	113	10.1	54.0	10.5	13.5	22.3	61.3
39022	11	17 3 71	33.1	48	20.37	20.7	4.37	0.7	4.3	125	18.2	55.0	7.7	15.2	29.5	85.4
39022	12	25 4 71	17.1	15	20.31	19.7	3.75	7.3	9.2	126	8.8	51.7	11.8	21.5	21.6	51.0
39022	13	10 6 71	37.9	24	25.37	30.3	2.14	48.4	7.8	94	16.3	26.1	10.6	28.6	22.0	60.9
39022	14	13 6 71	25.7	22	13.50	20.3	3.32	15.4	7.5	117	6.5	25.3	11.6	18.0	21.1	53.7
39022	15	18 6 71	35.7	41	24.02	19.7	2.39	13.6	2.1	113	15.7	43.9	12.2	18.0	22.2	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	37	[illegible]	[illegible]	[illegible]	20.7	3.4	109	16.2	35.1	10.2	32.2	22.3	64.4
39022	[illegible]	18 1 75	20.0	8	19.73	18.0	3.75	0.	4.1	129	8.1	40.3	12.7	18.1	13.6	60.4
39022	[illegible]	19 1 75	23.8	30	22.58	19.4	5.85	0.	11.2	136	7.3	30.6	16.3	10.6	14.3	39.6
[illegible]	[illegible]	[illegible] 67	38.8	32	17.30	19.1	0.98	28.0	9.8	106	[illegible]	20.5	*	*	*	*
[illegible]	[illegible]	[illegible] 67	14.8	21	11.12	7.3	1.89	19.2	6.1	111	[illegible]	23.2	*	*	*	*
[illegible]	[illegible]	[illegible] 67	14.7	17	6.01	11.0	1.20	0.	1.0	125	[illegible]	16.8	*	*	*	*
[illegible]	[illegible]	[illegible]	17.2	29	9.04	14.5	2.11	0.	6.9	131	[illegible]	21.3	*	*	*	*
[illegible]	[illegible]	[illegible]	11.3	14	7.51	8.4	1.90	0.6	1.4	125	[illegible]	20.2	*	*	*	*
[illegible]	[illegible]	[illegible] 68	21.4	13	5.65	10.0	0.87	13.2	0.	111	1.7	7.9	*	*	*	*
[illegible]	[illegible]	[illegible] 68	27.4	45	5.93	13.0	0.54	42.7	7.1	89	2.6	9.4	*	*	*	*
[illegible]	[illegible]	[illegible] 68	21.2	33	9.27	11.5	1.16	2.6	0.3	122	3.8	18.0	*	*	*	*
39025	[illegible]	[illegible] 68	18.2	36	5.91	10.1	1.58	0.	2.2	127	4.2	23.0	*	*	*	*
39025	13	[illegible] 68	17.3	5	18.73	15.6	[illegible]	0.	6.3	131	6.8	39.6	*	*	*	*
39025	14	24 12 68	20.0	21	10.79	[illegible]	2.43	0.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	12.1	18.0	30.2
39025	16	12 3 69	23.2	26	21.45	16.1	2.17	0.	16.0	140	11.7	50.4	14.5	17.9	18.5	39.7
39025	17	22 1 71	23.6	30	23.28	16.6	4.51	1.4	7.2	130	9.3	39.3	21.5	15.0	12.1	27.5
39026	1	9 12 66	19.6	24	17.54	26.9	2.82	0.	2.6	127	7.9	40.5	10.5	28.6	18.7	68.5
39026	2	8 3 67	24.1	49	9.34	14.6	1.52	0.	1.5	126	5.3	23.9	*	*	*	*
39026	3	14 5 67	31.1	30	10.89	17.3	1.05	7.3	3.9	121	7.6	24.3	8.5	14.1	25.8	79.2
39026	4	26 5 67	24.6	27	9.31	15.1	1.33	2.3	2.3	125	5.0	20.4	11.3	18.5	19.0	60.4
39026	5	22 12 67	26.5	46	9.66	28.7	1.89	4.9	1.4	121	8.7	32.8	*	*	*	*
39026	7	9 7 68	70.7	26	27.09	25.3	0.56	45.9	3.1	82	15.7	22.2	9.0	26.0	[illegible]	76.6
39026	8	1 11 68	16.0	17	17.93	26.3	2.14	0.	6.4	131	8.1	50.4	*	*	*	*
39026	9	21 12 68	[illegible]	22	[illegible]	14.7	3.72	0.	3.6	128	3.9	27.5	*	*	*	*
39026	10	11 [illegible] 69	13.1	32	11.59	23.4	2.76	0.	1.2	126	6.0	45.6	9.8	14.5	22.8	67.9
39026	11	12 3 69	25.0	33	25.37	25.0	0.70	1.2	6.8	130	15.2	60.6	*	*	*	*
39036	4	18 6 71	35.8	20	0.37	7.4	0.13	6.3	4.7	123	1.2	3.4	*	*	*	*
39052	1	27 2 67	14.9	17	4.83	4.9	0.91	0.	4.4	129	4.9	32.8	19.0	6.0	14.1	30.3
39052	2	1 11 67	18.3	18	6.82	3.1	2.18	0.	8.0	132	4.2	22.8	23.7	3.9	12.0	22.9
39052	5	9 6 71	52.4	29	10.66	8.5	0.45	49.0	7.8	83	13.2	25.2	18.5	6.2	12.3	35.5
39052	6	18 6 71	37.2	15	10.73	5.2	0.57	20.0	3.2	108	12.2	32.8	20.2	8.6	11.3	32.4
39052	7	27 8 73	15.3	3	4.55	2.7	0.22	112.6	0.	12	[illegible]	6.5	*	*	*	*
39052	8	18 4 75	21.3	11	10.45	3.8	1.06	4.8	1.4	121	[illegible]	22.8	36.0	4.2	6.8	17.3
39052	9	12 11 74	43.0	42	10.89	5.6	0.78	8.5	6.3	122	17.1	39.7	*	*	*	*
39052	10	20 11 74	39.2	31	12.13	5.1	2.46	0.	8.4	133	14.6	37.1	[illegible]	4.3	20.0	31.3
39053	2	14 9 68	127.0	21	63.34	11.7	1.45	0.	2.3	127	54.1	42.3	[illegible]	13.5	13.2	37.1
39053	3	19 2 69	23.3	27	21.00	13.4	1.29	1.1	0.3	124	15.0	64.3	*	*	*	*
39053	4	13 11 70	60.8	34	22.68	8.9	0.82	45.5	3.8	80	27.5	45.2	[illegible]	6.5	10.6	47.0
39053	5	18 6 71	33.3	18	25.73	11.0	0.97	0.	4.4	129	18.1	54.2	[illegible]	[illegible]	12.5	33.5
39053	6	10 2 74	43.8	21	28.05	10.1	2.92	0.	11.0	135	24.1	55.0	19.2	[illegible]	10.0	37.9
39053	7	14 2 74	26.6	16	23.59	7.5	2.83	0.	10.8	135	15.4	58.1	22.0	[illegible]	8.0	36.5
39053	8	19 1 75	31.3	17	26.48	6.0	2.48	0.	7.2	132	17.0	54.3	*	*	*	*
39813	1	22 1 60	41.1	44	3.48	7.9	0.65	0.	5.1	130	21.5	52.3	*	*	*	*
39813	2	2 11 60	40.3	42	3.53	5.0	0.68	0.	11.1	136	19.2	47.7	20.3	6.3	[illegible]	[illegible]
39813	3	2 12 60	43.3	35	4.90	8.8	0.63	0.	5.0	129	22.5	51.9	21.7	[illegible]	9.6	[illegible]
39813	4	28 1 61	33.9	27	[illegible]	10.7	0.67	0.	4.5	129	17.6	52.0	18.3	[illegible]	11.0	[illegible]
39813	5	3 5 61	35.0	15	3.69	6.3	0.44	6.7	3.1	121	12.0	34.3	23.0	6.0	[illegible]	25.3
39813	6	1 6 64	31.2	4	5.85	4.6	1.54	42.9	20.6	102	11.2	35.9	31.8	6.0	7.6	[illegible]
39813	8	22 10 66	37.6	10	3.35	7.3	0.39	39.7	3.9	89	18.4	48.9	15.8	7.0	16.2	38.0
39813	9	16 12 68	29.1	27	2.52	7.3	0.59	0.	8.2	133	12.5	43.1	16.0	8.5	16.2	37.1
39813	10	19 2 69	21.6	21	2.65	12.8	0.29	2.1	0.3	123	14.2	65.6	*	*	*	*
39814	2	6 3 60	7.9	2	2.89	3.6	0.03	108.6	1.3	17	2.5	32.1	*	*	*	*
39814	3	14 9 60	46.2	14	4.67	1.5	0.05	98.4	0.	26	9.8	21.1	93.8	1.3	2.0	7.9
39814	4	3 12 60	32.8	13	6.24	2.4	0.21	0.	10.8	135	19.0	57.9	93.9	1.3	2.7	6.4
39814	6	3 9 61	11.4	2	2.97	1.9	0.04	129.5	0.	-4	2.7	24.0	120.9	2.3	2.0	5.1
39814	8	1 6 64	29.5	4	3.76	1.7	0.22	14.1	15.3	126	11.6	39.3	67.7	2.3	3.8	8.8
39814	10	21 7 64	17.3	2	9.30	1.2	0.28	62.1	5.3	68	11.8	68.0	114.0	2.2	2.2	[illegible]
39814	12	22 6 66	29.7	8	6.01	1.3	0.04	81.0	4.9	68	9.0	30.4	106.6	2.2	2.4	[illegible]
39814	13	25 6 67	21.3	5	3.71	1.5	0.06	50.6	11.3	85	7.0	33.1	100.2	1.8	2.4	6.2
39814	14	17 9 67	27.5	4	7.61	2.1	0.08	104.2	1.0	21	12.2	44.0	126.9	1.8	1.8	5.3
39814	15	27 10 68	30.0	23	6.42	1.9	0.02	6.1	0.2	119	8.3	27.8	126.9	1.8	2.0	4.8
39814	16	31 10 68	17.1	5	4.69	1.8	0.05	1.0	5.2	129	4.4	25.8	113.1	2.1	2.3	5.3
39814	17	13 12 69	19.8	9	5.36	2.6	0.12	20.2	1.1	105	11.4	57.4	106.3	2.3	2.6	5.3

CATCH NO	EV NO	DATE OF STORM	RAINFALL TOTAL (MM)	RAINFALL DURN (H)	PEAK FLOW (CUMECS)	LAG (H)	ANSF (CUMECS)	SMD (MM)	APIS (MM)	CWI (MM)	RUNOFF (MM)	RUNOFF %	1-HOUR UNIT HYDROGRAPH: UH PEAK (CUMECS PER 100 SQ KMS)	TIME TO PEAK (H)	WIDTH AT 0.5 PEAK (H)	UH TIME BASE (H)
39814	18	19 8 70	12.7	9	6.54	1.2	0.04	138.3	8.8	-4	5.4	44.2	122.1	1.5	2.0	5.1
39820	2	23 9 55	40.8	14	11.55	6.0	0.27	48.0	9.2	86	16.9	41.5	*	*	*	*
39820	3	21 1 62	22.3	20	7.88	4.4	0.76	0.	6.8	131	11.7	53.1	*	*	*	*
39820	4	7 6 63	18.2	5	15.81	3.8	0.35	50.1	3.0	77	13.0	71.2	*	*	*	*
39820	5	9 12 66	16.6	14	5.84	6.7	0.29	0.1	2.1	127	8.4	50.8	32.5	6.0	7.3	19.6
39820	8	[illegible]5 9 68	38.8	21	6.33	10.4	0.37	38.3	15.5	102	21.1	54.4	*	*	*	*
39820	9	7 10 68	22.1	22	5.07	5.1	0.19	4.9	0.	120	7.2	32.7	*	*	*	*
39820	10	1 11 68	15.1	19	5.58	6.5	0.36	0.	4.7	129	6.6	43.5	*	*	*	*
39820	11	16 12 68	33.8	17	6.35	6.5	0.34	0.	2.8	127	14.0	41.4	27.6	7.1	8.8	22.7
39830	1	6 7 63	23.1	11	1.23	2.9	0.01	77.3	1.1	45	2.3	10.0	52.0	2.9	4.8	11.8
39830	2	1 6 64	25.4	8	2.03	2.0	0.10	24.5	16.8	117	4.4	17.3	50.7	3.1	4.8	12.4
39830	3	18 8 64	18.7	11	1.30	3.2	0.04	88.9	6.2	42	1.7	9.0	59.5	2.3	4.1	10.4
39830	5	22 6 66	27.0	7	1.64	3.1	0.03	81.3	1.4	45	3.3	12.2	57.2	3.3	4.0	11.4
39830	6	29 8 66	51.5	16	1.28	2.0	0.07	101.7	0.0	23	2.8	8.7	*	*	*	*
39830	7	2 10 66	10.6	10	1.42	1.9	0.12	73.3	4.3	55	2.4	12.4	59.4	3.2	4.3	10.0
39830	8	29 5 67	9.7	10	1.18	2.8	0.13	14.5	1.6	112	1.6	16.2	66.5	3.3	3.7	9.4
39830	9	23 6 67	26.2	8	1.62	2.4	0.05	60.5	0.	64	3.4	13.0	56.7	2.8	4.8	10.7
39830	11	1 11 67	19.9	9	1.95	3.1	0.19	22.0	5.8	108	3.9	19.6	47.6	3.9	4.9	13.5
39830	12	16 12 68	26.2	14	1.53	3.6	0.18	0.	5.2	130	5.1	19.5	38.0	4.1	5.5	18.2
39830	13	25 5 67	25.9	5	2.21	2.5	0.11	51.4	8.7	82	4.0	15.0	37.5	3.3	4.3	10.7
39831	1	6 7 63	23.8	11	1.25	1.7	0.03	77.3	0.8	48	2.3	9.8	*	*	*	*
39831	2	16 4 64	11.5	9	1.45	1.1	0.04	8.5	4.2	120	4.4	10.1	136.9	1.6	1.6	5.0
39831	3	1 6 64	25.6	8	1.70	2.2	0.07	25.6	14.1	113	4.6	14.0	*	*	*	*
39831	4	12 6 64	14.3	8	1.29	1.4	0.02	18.0	0.2	107	[illegible]	[illegible]	95.3	1.2	2.2	6.9
39831	5	7 7 65	20.7	10	1.32	1.2	0.02	114.8	0.9	90	1.8	10.8	129	1.4	1.8	5.0
39831	6	2 9 65	15.3	5	1.65	1.4	0.03	120.0	1.9	6	1.4	9.5	134.4	1.6	1.6	5.1
39831	7	2 9 65	56.4	16	2.34	4.1	0.13	[illegible]	14.0	59	12.1	27.4	*	*	*	*
39831	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.0	0.04	[illegible]	2.2	45	3.2	12.1	*	*	*	*
39831	10	2 10 66	19.7	10	2.06	1.2	0.07	73.2	3.8	55	2.8	14.4	*	*	*	*
39831	11	18 10 66	5.4	7	1.52	1.1	0.11	41.1	5.2	89	5.2	22.2	131.1	1.7	1.6	5.3
39831	12	18 10 66	10.3	4	2.18	1.[illegible]	0.21	35.6	6.7	98	7.5	22.2	128.6	1.6	1.7	3.3
39831	13	29 5 67	11.4	10	1.99	[illegible]	0.08	14.6	1.7	112	9.5	13.5	*	*	*	*
39831	15	25 6 67	28.9	5	2.12	0.7	0.15	31.4	9.9	85	4.9	17.0	*	*	*	*
39831	16	27 9 67	16.4	5	1.89	1.9	0.03	104.2	0.8	21	1.0	11.6	178.2	[illegible]	[illegible]	3.2
39831	17	1 11 67	19.3	7	1.86	1.0	0.11	22.0	6.2	109	3.9	20.3	*	*	*	*
39831	18	10 7 68	14.4	4	1.87	1.0	0.08	40.0	6.1	61	[illegible]	9.5	*	*	*	*
39831	19	12 7 68	14.7	7	1.97	1.8	0.06	61.7	2.5	65	2.0	13.5	*	*	*	*
39831	20	16 12 68	29.1	17	2.02	3.3	0.12	0.	3.2	130	7.9	27.3	*	*	*	*
39831	22	20 9 7[illegible]	16.0	3	2.67	1.6	0.10	78.2	5.9	52	2.5	15.8	158.8	1.9	1.5	4.0
39831	23	23 6 67	26.2	8	1.69	1.0	0.05	60.9	0.	64	2.6	10.6	*	*	*	*
40004	6	21 3 69	36.1	36	[illegible]	15.1	[illegible]	[illegible]	[illegible]	127	23.2	53.9	7.3	13.1	27.3	61.3
40004	8	22 1 71	30.3	12	48.00	20.7	3.80	0.	5.2	130	20.9	68.4	11.0	19.2	22.3	37.0
40006	10	7 9 65	24.2	18	2.22	7.0	0.25	30.4	2.8	97	1.7	7.2	27.2	6.4	9.5	21.9
40006	11	8 12 65	29.2	25	5.24	14.3	0.35	0.2	1.0	125	6.7	23.0	23.2	6.4	9.3	29.5
40006	12	24 2 66	20.0	22	5.07	11.6	0.06	0.	3.2	128	5.3	26.3	*	*	*	*
40006	13	17 4 66	16.4	17	5.91	7.0	0.54	0.8	4.2	128	2.9	17.0	24.2	6.9	9.2	27.0
40006	14	29 11 66	12.6	6	3.40	8.1	0.50	0.	3.1	123	3.0	19.0	25.0	6.8	9.3	25.5
40006	15	[illegible] 12 65	20.7	21	4.09	11.1	0.60	0.	2.5	127	3.7	22.0	22.2	8.6	10.9	29.[illegible]
40006	16	25 1 67	11.8	7	4.63	[illegible]	0.84	0.	4.0	128	3.2	25.2	26.5	6.9	9.7	22.5
40006	17	20 2 67	14.7	10	3.57	7.3	0.53	0.	6.6	131	3.4	25.1	21.5	7.8	10.5	30.0
40006	[illegible]	27 2 67	[illegible]	17	[illegible]	10.3	0.51	0.	2.2	127	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
40006	[illegible]	[illegible] 4 67	[illegible]	14	[illegible]	5.1	0.57	3.5	1.0	122	3.5	17.0	25.6	6.5	9.0	25.[illegible]
40006	20	2 6 67	23.5	5	4.72	7.0	0.42	43.2	8.4	69	2.9	8.5	32.5	7.0	7.0	20.2
40006	21	[illegible] 11 67	35.0	20	7.23	13.4	0.57	15.0	6.3	115	10.5	30.1	*	*	*	*
40006	22	18 12 67	[illegible]	[illegible]	[illegible]	6.9	0.42	9.6	0.2	115	3.4	17.5	25.0	7.5	9.7	27.1
40006	24	21 12 68	9.7	8	4.37	6.5	0.90	0.	6.1	131	3.0	20.5	25.0	7.4	9.4	25.3
40006	26	11 3 69	31.3	44	6.52	10.8	0.73	0.	8.6	133	9.3	31.8	21.5	6.5	8.5	34.7
40006	27	14 9 69	26.3	16	34.86	7.1	0.72	41.0	1.5	85	42.3	36.7	27.4	7.0	9.0	22.0
40007	1	8 10 60	32.0	26	31.09	14.0	3.24	4.3	3.5	124	12.2	38.1	*	*	*	*
40007	2	25 10 60	30.8	17	62.08	14.5	4.23	0.	2.5	129	16.5	53.4	*	*	*	*
40007	3	28 10 60	25.4	20	57.08	19.2	7.70	0.	11.6	136	12.4	47.0	*	*	*	*
40007	4	31 10 60	27.5	29	48.63	12.2	12.53	0.	18.0	142	[illegible]	66.9	*	*	*	*
40007	5	25 11 60	23.4	14	42.97	14.4	7.84	0.	6.0	139	14.6	62.5	*	*	*	*
40007	6	2 12 60	51.1	31	100.30	9.3	7.81	0.	2.6	127	25.8	49.4	*	*	*	*
40007	7	[illegible] 7 61	30.0	31	40.42	18.7	4.85	0.2	4.2	128	19.4	62.8	*	*	*	*
40007	8	28 1 62	22.9	24	65.24	15.9	8.90	0.	6.6	133	17.6	53.6	*	*	*	*
40007	9	27 2 61	19.3	10	39.40	11.9	5.98	[illegible]	6.6	131	8.3	43.1	*	*	*	*
40007	10	10 1 62	20.6	14	40.81	13.9	4.22	0.	7.3	132	[illegible]	[illegible]	*	*	*	*
40007	11	21 1 62	20.9	19	33.09	10.8	10.69	[illegible]	6.9	131	8.6	32.7	*	*	*	*
40007	12	10 3 63	23.2	24	35.14	12.0	5.06	0.	7.5	132	9.2	35.0	*	*	*	*
40007	13	10 11 63	27.6	13	41.25	12.0	6.99	0.	4.0	129	[illegible]	34.7	*	*	*	*
40007	14	17 11 63	80.6	33	57.01	14.1	6.11	0.	4.6	129	42.6	52.1	*	*	*	*
40007	15	24 11 6[illegible]	32.3	30	28.95	14.9	4.80	0.	1.7	126	9.3	41.7	*	*	*	*
40007	[illegible]	[illegible] 6 64	42.0	22	43.84	17.6	2.47	[illegible]	1.7	118	[illegible]	20.8	*	*	*	*
40007	20	28 11 65	28.4	20	43.06	[illegible]	3.11	0.	3.2	128	10.8	38.0	*	*	*	*
40007	21	22 10 66	32.1	21	43.04	15.4	3.47	[illegible]	3.6	121	13.0	37.1	*	*	*	*
40007	22	[illegible] 2 67	28.9	[illegible]	45.40	15.3	4.28	0.	2.1	127	13.4	46.4	*	*	*	*
40008	[illegible]	[illegible] 3 63	18.8	[illegible]	26.32	16.0	3.63	0.	8.1	133	4.5	25.6	*	*	*	*
40008	2	2 4 64	27.1	33	[illegible]	24.1	2.03	6.7	0.2	118	7.9	29.0	*	*	*	*
40008	3	8 12 65	20.3	12	16.04	13.1	2.42	0.	2.0	127	7.4	36.4	*	*	*	*
40008	4	9 2 66	25.3	30	20.23	10.9	4.43	0.	3.9	127	9.2	36.4	*	*	*	*
40008	5	24 2 66	21.1	30	19.25	18.6	3.87	0.	3.0	127	7.0	33.2	*	*	*	*
40008	6	22 10 66	25.5	23	19.30	24.1	3.34	0.	7.1	132	11.1	43.5	*	*	*	*
40008	7	27 10 66	44.0	[illegible]	27.75	28.1	3.02	1.0	6.4	125	24.2	55.0	*	*	*	*
40008	8	9 12 66	19.6	16	20.5[illegible]	22.3	4.81	0.	[illegible]	128	7.9	40.4	*	*	*	*
40008	9	27 2 67	18.5	24	17.5[illegible]	11.3	3.40	0.	2.3	12[illegible]	5.6	30.0	*	*	*	*
40008	13	17 11 63	42.0	51	22.47	41.3	5.50	0.	10.9	135	12.0	39.6	*	*	*	*
40009	3	20 4 63	17.8	12	27.64	7.2	2.14	2.5	1.1	124	[illegible]	38.6	25.7	[illegible]	8.5	20.3
40009	5	2 9 65	58.8	26	29.77	[illegible]	0.45	76.8	0.3	46	10.3	[illegible]	21.3	[illegible]	12.1	20.1
40009	6	28 11 65	23.5	14	26.34	[illegible]	[illegible]	0.	2.4	127	9.5	40.3	20.1	9.0	11.9	28.9
40009	7	8 12 65	41.3	38	41.76	15.8	[illegible]	0.2	1.9	125	24.8	60.0	18.7	[illegible]	12.0	31.6
40009	9	9 2 6[illegible]	13.9	17	30.86	7.2	[illegible]	0.	9.4	134	10.7	[illegible]	21.3	5.1	12.0	20.2
40009	10	19 10 66	20.5	13	27.63	9.3	0.72	0.0	11.3	135	5.3	25.6	34.2	9.0	8.3	15.5
40009	12	27 2 67	26.8	18	34.13	6.9	0.88	0.	4.9	129	13.0	51.3	32.4	[illegible]	7.8	18.8

CATCH NO	EV NO	DATE OF STORM	RAINFALL TOTAL (MM)	RAINFALL DURN (H)	PEAK FLOW (CUMECS)	LAG (H)	ANSF (CUMECS)	SMD (MM)	APIS (MM)	CWI (MM)	RUNOFF (MM)	RUNOFF %	1-HOUR UNIT HYDROGRAPH: UH PEAK (CUMECS PER 100 SQ KMS)	TIME TO PEAK (H)	WIDTH AT 0.5 PEAK (H)	UH TIME BASE (H)
40009	20	17 11 63	71.3	53	39.73	5.5	5.22	0.	8.4	133	40.6	56.9	*	*	*	*
40009	22	22 1 71	24.2	24	32.02	5.4	3.46	4.3	5.1	125	14.8	61.0	30.0	5.4	5.3	20.6
40009	23	18 11 70	25.8	22	24.01	7.5	1.86	22.9	10.1	112	8.7	33.5	19.8	9.4	11.5	33.2
40009	24	18 6 71	23.2	15	23.05	9.2	1.63	12.0	4.2	117	8.0	34.5	22.7	7.8	9.9	20.3
40010	1	3 12 61	23.2	47	14.91	18.9	1.00	11.0	1.9	115	8.5	36.8	9.4	17.5	26.4	65.5
40010	2	12 12 61	13.5	13	16.36	19.3	2.80	0.	1.7	126	8.0	43.1	11.2	15.6	20.1	59.1
40010	5	15 3 63	10.0	6	14.03	14.0	4.75	0.	3.5	128	3.1	30.5	15.1	15.7	18.3	37.0
40010	6	10 11 63	12.5	13	15.38	16.9	1.28	0.	3.0	128	7.0	56.2	10.9	15.8	22.5	57.0
40010	7	17 11 63	57.4	53	31.00	20.5	2.93	0.	2.1	127	30.7	53.5	7.0	18.0	33.6	91.7
40010	8	24 11 63	19.2	31	16.42	16.3	2.82	0.	1.5	126	7.5	39.2	9.2	16.8	28.6	63.7
40010	9	14 3 64	47.3	47	29.65	15.0	1.16	0.4	4.0	128	24.8	52.4	*	*	*	*
40010	10	18 3 64	15.9	25	19.07	23.4	3.27	1.4	4.2	127	7.8	48.9	10.9	14.7	22.4	57.2
40010	11	20 4 64	23.6	41	15.27	17.7	1.73	1.0	4.3	125	10.7	45.5	8.8	15.5	27.2	72.0
40010	12	31 3 64	40.2	29	14.83	19.1	0.50	31.3	0.	93	5.0	19.9	9.4	13.5	26.0	66.3
40010	13	18 4 65	29.3	38	19.31	15.8	1.22	9.9	2.4	118	10.4	36.9	11.2	11.6	19.7	59.9
40010	14	13 1 65	15.6	6	15.82	13.7	2.59	2.9	1.8	123	6.2	40.1	11.5	13.7	22.4	51.9
40010	16	28 11 65	24.2	20	24.91	24.6	1.33	0.	2.0	127	15.1	62.3	8.4	20.6	29.4	73.0
40010	17	4 12 65	12.0	23	13.70	17.6	2.43	0.	2.2	127	4.7	39.4	11.5	14.6	21.0	56.7
40010	18	8 12 65	25.8	26	24.75	24.7	1.50	0.2	1.1	125	13.2	51.4	10.2	22.9	23.5	62.0
40010	19	19 12 65	18.0	26	23.34	23.9	7.20	0.	6.3	131	6.7	37.1	13.6	17.0	20.0	41.8
40010	20	8 2 66	21.6	26	25.64	24.8	2.77	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
40010	21	18 2 66	30.1	67	21.67	25.9	1.22	2.4	0.	127	18.2	60.6	8.1	13.4	25.7	55.5
40010	22	24 2 66	26.5	54	29.91	13.0	3.96	0.	4.4	120	15.2	57.4	*	*	*	*
40010	23	17 4 66	32.0	62	24.00	26.1	2.66	0.8	4.4	128	16.9	52.7	7.5	21.0	33.0	82.3
40010	24	22 10 66	30.6	70	29.31	22.7	1.35	7.3	2.0	119	18.5	60.5	7.7	18.4	33.4	77.6
40010	25	9 12 66	17.8	21	21.63	16.1	2.92	0.	2.0	127	9.0	50.3	10.3	14.2	21.7	64.6
40010	26	25 1 67	14.1	8	23.25	16.2	4.91	0.	4.4	129	8.8	54.6	18.6	11.9	23.6	12.6
40010	27	26 2 67	20.3	26	22.11	19.3	1.67	0.	1.8	126	11.0	53.9	*	*	*	*
40010	28	3 11 67	32.4	55	38.13	12.0	3.00	1.4	[illegible]	130	16.2	50.1	*	*	*	*
40010	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	44.7
40010	31	19 2 69	22.6	36	23.25	26.7	2.51	1.4	0.1	123	16.0	70.7	*	*	*	*
41005	2	19 2 66	31.2	36	23.97	19.3	3.02	0.	3.9	128	15.9	51.0	12.5	16.6	20.0	49.0
41005	3	24 2 66	27.3	20	37.69	[illegible]	3.99	0.	3.3	130	16.3	59.8	12.5	14.1	21.5	46.0
41005	4	17 4 66	36.0	65	23.06	18.5	3.23	0.8	3.8	128	10.8	32.3	12.0	18.0	14.0	64.7
41005	5	6 8 66	27.7	22	18.93	22.0	2.19	54.2	4.2	75	10.1	36.5	*	*	*	*
41005	6	22 10 66	32.7	13	33.26	24.2	1.96	3.1	4.8	124	18.7	57.3	10.0	21.0	23.0	65.2
41005	7	9 12 66	[illegible]	[illegible]	12.21	15.3	2.66	0.	2.3	127	6.2	44.7	*	*	*	*
41005	8	26 12 66	18.1	[illegible]	14.65	20.8	2.43	0.	2.5	127	8.4	46.6	12.0	17.5	17.5	57.7
41005	9	25 1 67	14.4	7	14.80	20.6	7.06	0.	7.7	132	7.3	50.3	13.8	21.4	16.5	47.6
41005	10	27 2 67	26.1	18	23.01	13.7	2.22	0.	1.6	126	12.8	49.0	13.2	19.6	18.0	48.2
41005	11	7 3 67	17.8	25	14.66	16.1	3.79	1.3	1.0	124	7.1	40.0	11.0	16.2	18.0	65.1
41005	12	9 4 67	24.4	12	16.70	14.5	1.38	0.7	0.6	124	4.4	26.1	13.0	14.2	14.5	43.1
41005	13	3 11 67	45.0	26	26.06	13.6	3.30	2.4	8.8	133	25.4	56.0	[illegible]	[illegible]	[illegible]	[illegible]
41005	15	2 6 68	18.2	22	22.82	13.6	5.37	0.	8.9	133	7.8	43.0	12.1	17.8	19.0	53.9
41005	16	14 9 68	65.0	17	48.50	19.3	1.07	53.4	3.6	75	19.0	28.8	*	*	*	*
41005	17	25 9 68	23.3	17	20.37	20.4	2.34	0.9	2.6	126	9.1	38.9	12.6	17.9	17.5	53.3
41005	18	1 11 68	12.7	11	17.71	14.9	4.53	0.	12.6	137	5.1	40.5	13.6	15.8	16.5	48.8
41005	19	20 12 68	20.8	26	21.83	19.9	2.99	0.	3.6	128	9.3	44.9	*	*	*	*
41005	20	21 12 68	19.6	20	22.59	13.6	5.88	0.	11.1	136	8.5	43.6	12.6	16.0	19.0	50.5
41005	21	15 1 69	13.1	13	17.25	15.5	4.15	0.	5.1	130	5.6	42.4	13.0	17.2	15.3	48.5
41005	22	17 1 69	14.0	12	21.43	15.2	3.87	0.	4.7	129	9.0	64.6	12.2	16.5	17.5	56.1
41005	23	27 1 69	17.6	17	17.79	15.2	4.17	0.	1.4	126	6.2	35.2	13.8	17.0	17.5	45.6
41005	24	19 2 69	28.5	46	19.46	23.8	2.85	1.4	0.3	123	13.1	65.9	*	*	*	*
41005	25	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	13.5	50.4	11.6	17.0	21.0	53.4
41006	1	3 11 67	45.4	26	42.23	11.9	1.46	1.4	9.0	133	33.1	72.9	27.4	12.8	11.0	18.6
41006	3	5 2 68	22.2	22	24.91	13.2	3.32	0.	7.6	132	13.5	[illegible]	22.5	15.5	13.4	22.6
41006	4	14 9 68	31.0	14	9.63	13.1	0.59	55.2	5.4	75	4.7	15.2	26.6	12.9	9.9	22.0
41006	6	21 12 68	12.3	6	19.54	11.5	[illegible]	0.	8.3	133	[illegible]	72.6	23.2	12.0	10.0	27.9
41006	8	12 3 69	23.8	31	31.68	8.5	2.38	[illegible]	11.1	133	15.8	66.5	31.5	11.1	9.6	16.1
41006	9	17 6 71	31.0	19	37.84	15.6	0.43	2.0	7.1	130	18.9	[illegible]	*	*	*	*
41006	10	15 11 69	32.4	23	34.23	12.3	1.53	45.7	12.1	91	14.1	43.5	25.0	13.5	12.0	26.3
41006	11	15 11 70	23.3	23	21.52	11.1	2.17	22.0	8.3	111	10.7	46.0	22.3	14.5	19.9	26.1
41006	12	22 1 71	24.5	20	26.65	14.4	[illegible]	0.	4.9	129	19.4	79.0	20.7	14.5	[illegible]	26.7
41006	13	14 6 71	43.3	22	24.55	11.6	0.29	38.4	16.6	105	18.7	43.1	*	*	*	*
41006	14	18 6 71	30.6	13	36.97	14.8	0.40	14.4	6.0	117	18.6	60.9	*	*	*	*
41006	15	8 12 72	22.6	15	22.76	13.2	2.85	23.4	14.1	115	10.3	45.6	28.7	12.0	9.6	19.5
41006	16	10 2 74	39.5	19	46.60	12.7	1.53	0.	5.5	130	32.0	80.9	24.9	11.4	10.0	[illegible]
41006	17	14 2 74	27.9	18	39.95	11.1	2.03	0.	11.9	136	21.1	75.5	21.5	10.5	11.0	[illegible]
41006	20	1 12 75	26.2	18	32.78	12.0	1.13	13.4	4.1	115	17.4	66.3	27.0	11.5	10.1	21.3
41007	2	3 12 60	35.5	27	99.71	21.2	12.41	0.	1.9	126	30.9	87.1	8.1	14.5	30.5	[illegible]
41007	4	27 2 61	18.8	41	61.19	21.1	12.38	0.	6.1	131	12.5	66.4	11.3	25.6	[illegible]	30.4
41007	5	3 5 61	27.3	27	65.82	32.4	0.33	5.2	2.7	119	21.5	78.9	8.2	32.7	30.2	75.2
41007	6	16 11 63	60.3	58	103.65	[illegible]	13.29	0.	3.8	128	53.5	88.8	7.8	22.2	29.5	85.6
41007	7	13 3 64	58.8	49	97.56	23.5	1.69	6.2	0.2	118	43.5	73.6	10.0	34.0	28.5	84.2
41007	8	31 5 64	55.0	62	77.80	27.2	0.32	44.5	0.	80	37.6	68.4	*	*	*	*
41007	9	[illegible] 11 65	29.4	[illegible]	66.90	27.6	0.01	0.	1.9	126	20.3	69.1	9.5	32.6	29.3	58.5
41007	10	32 10 66	33.2	21	82.56	[illegible]	0.06	39.7	2.4	87	26.9	81.1	8.3	26.8	34.2	65.6
41007	11	[illegible] 9 68	105.9	54	298.73	15.5	6.81	19.3	5.1	110	51.2	76.6	*	*	*	*
41007	12	15 12 68	49.5	73	79.35	[illegible]	2.31	0.1	0.	124	42.2	85.3	*	*	*	*
41007	13	[illegible] 5 69	35.1	46	[illegible]	25.2	0.22	5.9	7.4	123	25.9	73.8	*	*	*	*
41015	1	30 10 67	17.2	12	0.35	4.7	0.05	12.9	5.1	117	0.1	0.8	40.7	4.8	5.0	15.5
41015	2	16 12 68	34.5	10	0.70	3.1	0.87	10.2	8.0	122	1.0	2.8	34.5	4.2	6.0	19.2
41015	3	21 12 69	16.1	16	0.26	5.6	0.05	9.8	4.9	120	0.1	0.9	31.5	5.3	8.9	19.1
41015	4	[illegible] 11 70	30.1	20	0.32	3.4	0.03	42.3	2.5	79	0.2	0.8	30.0	3.8	7.4	22.1
41015	5	22 11 70	19.3	16	0.48	6.4	0.08	0.7	5.7	130	0.3	1.7	24.2	4.7	9.3	27.4
41015	6	5 2 72	16.2	14	0.34	3.6	0.07	0.	4.8	129	0.2	1.2	29.7	3.6	7.3	21.6
41015	7	15 9 74	19.8	15	0.26	3.3	0.05	51.3	1.2	74	0.1	0.7	31.3	4.1	8.1	19.3
41015	8	19 10 74	13.8	5	0.53	2.2	0.16	9.8	13.1	128	0.2	1.1	48.6	2.9	4.5	13.9
41015	9	26 9 75	37.5	16	0.41	5.1	0.06	37.7	11.8	99	0.2	0.6	28.7	[illegible]	8.1	26.5
41015	10	28 11 75	14.6	9	0.35	4.2	0.06	21.3	5.0	108	0.2	1.2	[illegible]	4.9	6.6	19.3
41021	1	14 12 69	15.3	19	1.33	9.2	0.11	11.2	2.2	116	10.3	67.4	*	*	*	*
41021	2	3 3 70	20.0	13	1.02	7.6	0.07	0.9	0.4	124	7.8	39.2	*	*	*	*
41021	5	10 1 72	28.9	27	1.91	9.5	0.06	3.7	1.0	122	14.1	48.7	*	*	*	*
41021	6	24 9 72	14.0	11	1.43	6.8	0.06	0.6	4.4	128	8.9	63.6	*	*	*	*
41021	9	19 2 73	13.4	16	0.77	10.1	0.05	[illegible]	0.9	125	6.3	46.8	*	*	*	*

CATCH NO	EV NO	DATE OF STORM	RAINFALL TOTAL (MM)	RAINFALL DURN (H)	PEAK FLOW (CUMECS)	LAG (H)	ANSF (CUMECS)	SMD (MM)	API5 (MM)	CWI (MM)	RUNOFF (MM)	RUNOFF %	1-HOUR UNIT HYDROGRAPH: UH PEAK (CUMECS PER 100 SQ KMS)	TIME TO PEAK (H)	WIDTH AT 0.5 PEAK (H)	UH TIME BASE (H)
41022	1	28 11 70	25.5	19	9.99	9.5	0.62	0.	1.0	125	13.3	52.0	19.0	12.0	11.5	35.5
41022	4	5 3 72	11.9	3	6.79	5.4	1.28	0.	12.1	137	6.0	50.2	22.5	7.5	11.5	26.4
41022	5	12 12 72	14.7	3	5.64	5.6	2.16	9.8	5.0	120	6.3	43.0	21.0	9.8	13.0	27.0
41022	7	21 11 74	23.0	14	27.45	7.8	9.29	0.	13.2	138	11.7	46.6	34.0	7.6	8.0	16.7
41022	8	19 1 75	34.3	18	29.56	7.2	1.62	35.6	5.1	94	21.8	63.6	33.0	7.6	8.0	17.7
41022	10	8 3 75	14.3	10	13.09	5.2	1.66	0.	5.6	130	6.6	46.5	25.0	4.8	10.5	23.5
41022	11	18 4 75	20.7	15	10.38	7.9	0.77	3.5	2.9	124	10.3	49.8	19.0	4.0	14.0	30.5
41022	12	1 12 75	32.7	18	16.49	6.4	0.69	12.5	3.3	115	14.0	42.7	25.0	4.6	9.5	25.5
41025	2	10 2 72	14.6	38	3.62	17.9	1.19	0.2	1.9	126	7.9	53.9	•	•	•	•
41025	3	4 3 72	20.6	19	17.50	22.6	1.12	0.	5.1	130	13.1	63.6	•	•	•	•
41025	5	12 12 72	13.5	17	11.99	21.9	3.86	0.	7.2	132	5.9	43.9	•	•	•	•
41025	7	14 2 74	25.6	20	23.68	15.1	2.30	0.2	5.0	129	16.9	66.2	•	•	•	•
41025	10	24 12 74	23.4	26	20.14	22.5	1.94	0.	4.1	129	14.3	61.9	•	•	•	•
41025	12	1 12 75	26.3	17	21.90	19.2	0.51	14.1	3.8	114	16.3	61.4	•	•	•	•
41028	1	13 1 65	20.1	13	5.39	12.2	0.47	2.9	3.0	125	10.6	52.8	21.0	9.5	11.4	30.2
41028	2	19 11 65	43.6	16	3.93	7.1	0.55	0.	3.3	128	17.6	40.4	22.5	6.8	11.5	26.4
41028	3	23 11 65	27.4	21	[illegible]	[illegible]	[illegible]	0.	[illegible]	127	13.1	47.8	21.5	7.6	10.7	30.3
41028	4	8 12 65	35.3	26	10.40	11.1	0.39	0.	3.1	129	20.1	56.8	•	•	•	•
41028	5	22 12 65	23.8	14	7.50	6.8	0.82	0.2	1.4	126	12.8	53.7	27.0	7.6	9.0	23.2
41028	6	19 2 66	33.3	35	6.19	11.9	0.65	0.	4.7	129	19.4	58.8	26.0	7.3	8.6	27.5
41028	7	20 2 67	16.0	9	6.17	3.0	0.50	0.	8.4	133	8.7	54.4	29.3	8.5	8.2	21.6
41028	8	27 2 67	26.8	17	5.63	7.6	0.37	0.	2.6	127	13.7	51.2	20.8	8.7	12.0	29.5
41028	9	3 11 67	45.5	24	7.70	12.0	0.72	1.4	12.1	135	21.6	47.4	19.4	10.0	15.0	27.3
41028	10	2 2 68	19.1	11	6.29	5.6	0.57	0.	8.6	133	10.2	53.5	24.5	9.0	9.3	26.4
41028	11	11 10 68	26.2	13	6.79	6.8	0.84	0.6	7.0	131	12.5	47.8	21.9	9.0	10.3	[illegible]
41028	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	137	9.9	50.8	29.0	7.1	8.4	21.5
41028	14	21 11 69	19.4	20	3.69	9.0	0.18	26.2	5.9	104	9.3	48.0	20.3	7.5	11.0	32.8
41028	16	22 1 71	29.3	13	6.11	9.2	0.75	0.2	5.9	130	14.0	47.6	21.5	10.4	12.6	26.5
41028	17	10 1 72	31.2	15	4.27	11.8	0.16	0.	2.5	127	11.6	37.3	18.8	11.3	12.0	35.1
41028	18	10 2 74	42.9	19	8.48	9.1	0.69	0.	3.9	130	23.1	53.9	21.6	10.1	12.7	26.6
41028	19	21 11 74	40.4	18	13.42	3.5	3.08	0.	10.9	135	14.5	35.6	27.3	6.3	8.6	23.5
41028	20	19 1 75	31.7	26	8.27	8.5	0.66	0.	10.0	134	14.3	[illegible]	[illegible]	5.0	10.1	25.1
41801	3	19 2 67	[illegible]	26	3.51	5.2	0.02	0.	2.0	126	12.4	62.4	•	•	•	•
41801	4	12 3 69	18.2	17	0.96	3.3	0.07	0.	6.5	131	7.0	38.3	43.5	5.6	6.0	13.6
41801	5	31 3 69	19.7	5	1.62	2.3	0.03	41.8	1.2	94	3.5	18.0	•	•	•	•
41801	6	6 7 69	43.4	19	1.74	3.3	0.01	94.6	0.	30	7.1	16.3	55.8	4.0	4.1	11.7
41801	7	28 7 69	31.2	13	0.75	3.6	0.01	106.5	0.	18	4.5	16.5	51.6	2.2	4.2	13.2
41801	8	1 8 69	15.3	5	1.31	1.9	0.02	92.1	1.6	34	2.7	17.6	64.6	3.2	3.8	9.6
41801	9	2 8 69	19.8	8	3.77	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3.6	4.4	11.0
41801	10	11 11 70	35.6	30	2.76	5.6	0.06	52.5	3.0	75	42.6	76.6	•	•	•	•
41801	12	13 6 71	59.8	34	2.93	6.8	0.02	39.0	4.7	70	19.8	33.2	38.5	4.1	4.5	19.9
41801	13	18 6 71	30.8	12	1.48	4.1	0.05	15.1	6.6	116	12.9	41.8	39.2	3.1	6.5	15.4
41801	15	8 11 69	23.3	7	1.24	3.1	0.00	98.6	4.9	31	4.0	17.3	66.0	4.3	4.1	8.6
41801	16	6 12 72	12.5	9	2.68	4.1	0.05	44.3	8.8	89	5.2	41.9	65.0	4.1	3.8	9.3
41801	17	21 5 73	24.1	6	2.44	2.3	0.03	23.1	1.2	103	5.9	20.3	•	•	•	•
41801	19	21 11 74	30.2	17	3.02	3.8	0.15	0.	11.6	136	17.3	57.2	44.4	3.3	3.3	10.7
41801	20	28 11 75	29.5	8	2.96	3.5	0.14	14.4	8.7	119	10.7	36.2	53.0	3.5	4.3	12.4
45002	1	24 4 63	23.3	16	37.80	10.2	10.16	2.9	3.9	126	4.6	19.8	•	•	•	•
45002	2	19 11 63	50.7	35	[illegible]	[illegible]	[illegible]	0.	17.4	142	24.6	[illegible]	•	•	•	•
45002	3	10 1 64	[illegible]	[illegible]	[illegible]	[illegible]	7.35	0.	1.9	126	3.0	14.3	28.1	8.0	7.3	23.0
45002	4	12 11 64	30.8	24	69.96	7.4	6.04	29.9	1.9	96	4.5	14.7	•	•	•	•
45002	5	12 12 64	20.0	17	167.45	8.1	41.80	0.	7.5	132	13.6	47.0	•	•	•	•
45002	6	15 1 65	51.2	44	155.56	11.8	45.47	0.	13.1	138	27.6	54.0	•	•	•	•
45002	8	23 11 65	20.9	6	70.71	6.7	13.57	0.2	0.5	125	3.4	16.2	•	•	•	•
45002	9	28 11 65	26.0	21	102.56	5.9	31.17	0.	6.1	131	6.5	25.0	27.6	7.0	7.2	35.0
45002	10	8 12 65	66.2	47	188.51	14.7	32.22	0.1	3.7	128	37.1	56.1	•	•	•	•
45002	11	14 10 66	25.5	13	61.53	7.8	11.03	1.0	8.7	132	4.7	18.3	25.2	8.0	[illegible]	28.1
45002	12	9 12 66	34.5	26	109.80	5.9	23.14	0.	3.6	128	11.6	33.3	24.2	7.4	[illegible]	30.0
45002	13	11 12 66	47.5	44	133.76	12.2	40.20	0.	6.9	131	18.5	38.9	•	•	•	•
45002	14	30 12 66	28.9	19	147.10	8.8	41.89	0.	10.2	135	11.2	38.9	•	•	•	•
45002	15	20 2 67	32.5	21	148.83	9.9	36.45	0.	21.6	146	17.3	52.6	•	•	•	•
45002	16	27 2 67	34.5	21	134.16	6.6	26.51	0.	3.2	128	10.2	29.3	29.5	7.0	6.5	24.7
45002	17	8 1 68	51.0	21	163.66	13.5	29.95	0.	5.2	130	27.3	53.6	•	•	•	•
45002	18	9 7 68	55.1	20	169.32	10.8	16.44	10.5	3.4	117	15.7	28.5	27.4	7.0	6.6	27.4
45002	19	27 7 69	100.3	29	74.02	10.4	3.74	88.6	0.0	36	8.6	8.6	28.0	7.0	7.4	24.9
45002	20	18 9 69	36.5	10	90.35	5.8	6.63	15.8	5.4	114	4.6	12.4	•	•	•	•
45002	21	16 12 65	[illegible]	56	224.34	9.9	36.42	0.	8.1	133	65.3	61.1	•	•	•	•
45002	22	1 11 70	47.2	16	171.42	13.0	36.49	0.	3.8	128	24.1	51.1	•	•	•	•
45003	2	10 11 63	23.2	19	26.62	13.4	6.19	30.1	3.0	99	7.0	30.2	14.2	13.3	18.3	41.7
45003	3	15 1 65	24.2	31	31.35	5.1	7.81	0.	9.0	136	7.9	32.7	18.0	12.6	13.3	35.2
45003	4	19 1 65	25.3	23	63.94	9.7	5.03	0.	6.2	120	11.7	[illegible]	•	•	•	•
45003	5	28 11 65	25.3	19	62.01	9.2	6.05	2.4	4.9	127	11.2	44.3	22.8	10.5	11.0	26.8
45003	6	8 12 65	29.7	44	39.12	14.3	5.07	0.1	2.6	127	11.6	39.1	17.6	11.4	11.0	41.2
45003	7	1 1 66	21.2	25	33.24	5.4	9.27	0.	8.1	133	8.7	40.9	22.3	10.5	10.7	28.5
45003	8	22 12 66	25.8	6	47.45	12.2	3.56	46.8	3.4	79	10.5	36.4	20.0	11.0	11.0	33.6
45003	9	28 12 66	24.4	36	36.20	13.1	4.71	0.	3.1	128	8.9	36.6	20.0	11.6	10.2	33.2
45003	10	16 2 67	25.6	17	65.01	13.0	3.27	0.	16.0	140	13.1	59.2	23.0	10.1	11.0	24.3
45003	11	19 2 67	21.3	25	53.63	11.6	9.21	0.	11.2	136	9.0	42.0	23.4	10.2	11.0	35.3
45003	12	30 10 67	29.4	16	46.63	13.2	5.07	22.1	6.9	109	12.1	41.1	17.7	13.2	14.6	33.6
45003	13	8 1 68	31.7	24	71.59	11.0	4.86	0.	4.1	129	15.0	50.6	19.8	12.0	12.0	32.2
45003	14	10 7 68	51.6	11	201.86	6.4	3.06	42.0	0.4	87	30.3	58.6	•	•	•	•
45003	15	23 12 68	28.9	30	37.77	16.9	6.07	0.	4.4	129	12.3	42.6	16.5	9.3	14.0	39.4
45003	16	27 7 69	110.8	37	115.31	14.7	1.43	120.5	0.1	4	19.4	17.3	27.0	11.6	8.9	23.4
45004	1	16 2 67	35.6	30	62.95	9.3	7.75	0.	8.2	133	12.2	34.3	23.7	9.7	10.1	24.7
45004	2	3 3 67	48.4	20	42.07	12.7	2.24	39.6	0.	85	8.4	17.3	15.6	10.3	11.0	34.7
45004	3	15 10 67	29.4	32	60.06	13.1	0.80	35.9	8.2	97	11.9	40.6	19.2	12.2	15.4	33.5
45004	4	8 1 68	[illegible]	27	69.60	[illegible]	5.17	0.	3.3	126	13.1	43.4	17.3	12.2	[illegible]	[illegible]
45004	5	27 6 68	27.3	10	71.61	13.6	(2.86)	34.6	9.0	99	13.1	47.4	19.0	6.8	13.3	31.9
45004	6	26 10 68	38.9	35	44.22	12.5	2.36	7.0	0.3	118	12.8	50.6	18.2	10.6	14.4	23.6
45004	7	25 11 68	27.3	22	47.58	13.8	4.74	0.1	2.6	127	13.6	34.9	18.8	11.6	12.2	20.6
45004	8	16 12 68	23.9	11	46.65	8.8	6.25	0.	10.8	135	10.7	39.2	17.6	9.0	12.6	38.0
45004	9	17 12 68	15.6	23	73.00	7.6	7.68	0.	23.1	148	10.3	45.7	22.4	8.0	10.9	27.8
45004	10	21 12 68	23.1	21	71.37	4.6	8.64	0.	8.1	133	10.5	67.2	•	•	•	•
45004	11	26 12 68	30.6	31	60.59	13.5	8.35	0.	4.8	129	10.6	45.8	21.9	5.3	11.6	27.6
45004	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	12.9	42.1	19.3	10.8	13.2	31.2

CATCH NO	EV NO	DATE OF STORM	RAINFALL TOTAL (MM)	RAINFALL DURN (H)	PEAK FLOW (CUMECS)	LAG (H)	ANSF (CUMECS)	SMD (MM)	API5 (MM)	CWI (MM)	RUNOFF (MM)	RUNOFF %	1-HOUR UNIT HYDROGRAPH: UH PEAK (CUMECS PER 100 SQ KMS)	TIME TO PEAK (H)	WIDTH AT 0.5 PEAK (H)	UH TIME BASE (H)
45004	12	12 3 69	25.7	24	78.35	7.0	9.04	0.6	14.0	138	11.3	44.1	22.5	7.0	12.3	24.8
45004	13	27 7 69	83.4	26	73.34	15.7	1.37	120.1	0.2	5	12.0	14.4	•	•	•	•
45004	14	9 7 68	56.9	31	217.01	6.3	4.19	43.2	2.4	54	21.6	37.9	•	•	•	•
45004	16	5 3 72	59.9	47	89.32	11.3	10.88	0.	12.6	137	31.0	51.8	•	•	•	•
45804	1	9 12 66	43.9	26	70.29	8.1	8.62	0.	8.6	133	19.9	45.4	41.0	4.5	5.2	16.7
45804	2	12 12 66	57.5	29	81.96	6.7	12.03	0.	14.5	139	29.5	51.3	•	•	•	•
45804	3	30 12 66	41.2	19	100.57	4.6	13.83	0.	21.8	146	23.2	56.3	•	•	•	•
45804	4	27 2 67	42.7	19	88.69	4.5	10.16	0.	6.8	131	15.3	35.9	43.4	6.1	5.2	15.2
45804	5	1 4 67	36.7	23	49.28	7.4	2.59	2.4	2.2	124	11.2	30.4	•	•	•	•
45804	8	10 7 68	48.0	36	131.99	3.8	5.37	3.6	4.2	125	14.4	30.0	62.6	3.2	3.9	10.0
45804	9	27 7 69	100.7	29	27.18	13.1	1.09	87.2	0.5	38	8.4	8.3	29.8	6.0	7.5	22.3
45804	10	1 11 70	62.0	17	120.71	5.8	11.46	0.	19.1	144	38.3	61.8	35.0	5.6	6.6	18.6
45804	11	20 4 70	37.7	16	40.68	5.5	3.20	0.0	0.3	125	9.9	26.3	36.9	3.7	6.4	17.3
45804	13	18 10 71	44.8	20	85.98	5.6	7.32	18.1	7.2	114	16.8	37.5	•	•	•	•
45804	15	11 11 72	56.6	27	78.93	4.9	9.32	0.5	10.2	134	21.6	38.2	29.6	5.0	7.9	21.8
45804	16	1 4 73	46.2	14	47.11	5.6	1.84	11.7	1.9	115	8.1	17.6	50.0	3.0	4.8	12.6
45804	17	17 10 74	36.1	18	54.82	5.0	4.51	0.	2.0	126	12.9	35.8	40.6	3.8	5.3	16.8
45804	18	15 12 74	23.5	27	61.42	7.6	7.65	0.	3.1	128	11.7	49.7	46.0	6.0	4.9	14.4
45805	1	12 12 66	49.0	27	42.21	5.3	16.75	0.	12.7	137	16.2	33.0	•	•	•	•
45805	2	30 12 66	33.0	19	44.47	6.0	18.01	0.	19.6	140	8.0	24.1	•	•	•	•
45805	3	19 2 67	40.4	23	51.82	6.2	15.10	0.	15.5	140	16.0	39.7	24.6	4.8	9.9	25.6
45805	4	27 2 67	31.8	11	37.23	6.4	9.21	0.	3.5	128	7.0	22.1	•	•	•	•
45805	5	4 11 67	46.2	13	46.26	5.8	12.82	0.	8.3	133	12.0	26.0	•	•	•	•
45805	6	22 12 67	30.2	20	33.43	5.4	5.82	0.	5.9	130	6.7	22.1	29.0	5.6	7.6	23.1
45805	7	8 1 68	49.5	21	49.18	4.6	12.37	0.	4.9	133	20.0	[illegible]	•	•	•	•
45805	8	[illegible]	[illegible]	23	[illegible]	7.5	3.78	11.3	2.7	116	9.6	16.9	31.0	4.4	5.4	25.1
45805	9	27 10 68	33.7	13	21.54	7.5	5.32	0.	3.8	128	4.7	13.8	•	•	•	•
45805	11	22 11 70	27.3	19	22.67	5.3	10.69	0.	4.1	129	3.4	12.3	•	•	•	•
45805	12	25 1 71	25.1	14	32.00	5.0	16.61	0.	11.6	136	4.1	16.2	•	•	•	•
45805	14	6 6 72	25.8	9	19.88	6.4	4.95	0.	5.8	130	3.4	13.2	30.8	6.2	6.8	22.5
45805	15	11 11 72	52.7	29	33.00	8.6	4.09	0.1	9.7	134	10.6	20.2	21.8	7.1	7.8	35.4
45805	16	1 4 73	41.6	15	14.81	8.7	1.28	13.2	1.4	113	3.2	7.8	31.2	6.5	7.3	21.0
45805	17	10 11 74	17.7	13	20.30	5.9	5.71	0.	5.1	130	3.4	19.3	•	•	•	•
45805	18	19 1 75	28.3	23	33.90	5.9	6.59	0.	4.0	129	4.9	17.2	37.3	5.0	5.3	19.1
45805	19	21 1 75	36.5	22	41.88	6.7	14.19	0.	12.6	137	9.5	26.1	31.7	5.0	5.8	23.5
45805	20	27 1 75	22.1	12	42.62	5.3	13.21	0.	9.6	134	5.4	24.6	38.0	5.7	6.2	16.9
46003	1	16 8 63	21.7	24	73.30	4.2	8.31	6.4	8.8	127	4.9	22.6	47.2	4.2	4.9	13.8
46003	2	3 9 63	27.1	30	68.65	5.2	9.75	0.2	5.5	130	6.7	24.7	•	•	•	•
46003	3	3 11 63	[illegible]	[illegible]	133.03	[illegible]	16.33	0.	16.7	141	9.3	29.8	45.2	5.2	5.1	14.4
46003	4	3 11 63	32.7	13	128.02	2.3	32.47	0.	23.1	148	5.6	17.3	59.6	2.8	4.2	10.3
46003	5	18 3 64	28.4	13	115.69	5.8	28.72	0.	16.6	141	10.0	35.3	40.2	6.5	5.9	15.9
46003	6	14 7 64	30.7	15	69.26	3.8	5.90	17.0	3.5	111	6.6	21.6	•	•	•	•
46003	7	12 11 64	36.1	15	100.34	4.2	3.43	0.	9.6	134	9.1	25.3	47.6	4.0	5.2	13.0
46003	8	12 12 64	29.6	15	127.17	5.0	20.85	0.	12.0	136	12.0	40.7	48.0	5.6	5.0	13.2
46003	9	12 1 65	50.5	15	195.84	4.4	17.55	0.	7.7	132	19.0	37.6	43.5	4.5	5.2	15.2
46003	10	1 8 65	39.6	46	97.38	6.5	8.60	1.2	4.2	127	11.0	27.7	36.6	5.0	5.7	19.0
46003	11	28 11 65	39.6	13	190.45	5.1	18.09	0.	12.7	137	15.5	39.2	42.3	4.9	5.5	15.3
46003	12	9 1 66	49.4	25	129.34	6.5	14.48	0.3	0.4	125	15.4	31.0	•	•	•	•
46003	13	24 1 66	51.9	20	145.14	8.8	11.27	0.	2.1	127	19.1	36.9	•	•	•	•
46003	14	2 3 66	[illegible]	[illegible]	163.16	5.5	19.40	0.	4.7	120	19.7	[illegible]	•	•	•	•
46003	15	30 11 66	26.4	12	85.58	4.6	9.92	0.	9.0	133	7.6	31.2	51.0	4.8	4.0	13.8
46003	16	9 12 66	29.6	19	94.45	5.1	9.66	0.	4.0	128	10.3	34.8	•	•	•	•
46003	17	25 1 67	29.1	16	118.99	3.2	16.95	0.	10.9	135	11.7	40.2	46.8	3.4	5.0	13.8
46003	18	20 2 67	[illegible]	17	139.35	5.0	21.30	0.	21.4	146	14.1	40.8	38.0	5.4	6.4	16.5
46003	19	15 10 67	[illegible]	22	165.31	9.1	23.52	0.	13.2	138	25.0	41.8	•	•	•	•
46003	20	21 6 68	52.2	23	216.75	5.2	6.01	9.2	7.1	122	15.0	28.7	36.5	4.7	5.9	18.7
46003	21	26 6 68	41.4	17	188.19	6.1	9.96	3.0	12.7	134	14.6	35.3	47.4	4.4	4.8	13.9
46003	22	27 10 68	44.2	16	137.09	7.9	16.62	0.	9.1	134	17.6	39.8	39.5	6.5	5.9	16.3
46003	25	27 7 69	121.7	31	192.44	6.1	4.71	78.6	0.2	46	22.1	18.2	42.0	3.0	4.6	17.3
46005	1	12 11 64	38.1	15	24.81	4.8	0.48	0.	9.6	134	24.5	64.4	56.0	3.5	3.8	12.3
46005	3	28 11 65	39.9	13	38.15	3.2	1.20	0.	12.5	137	25.4	63.6	60.0	3.2	3.9	10.7
46005	6	28 12 66	48.3	20	31.69	5.2	3.00	0.	6.4	131	28.0	57.9	55.8	5.6	4.6	10.7
46005	11	21 12 68	34.4	17	30.35	1.0	0.98	0.	8.5	133	22.9	66.4	60.0	3.5	4.1	10.3
46005	13	13 12 69	49.2	15	31.43	5.1	0.75	0.	0.7	125	29.0	59.0	73.4	4.4	3.3	8.5
46005	14	8 9 70	32.6	9	31.34	3.7	[illegible]	0.	12.6	137	24.2	74.2	[illegible]	3.1	3.3	8.5
46005	18	12 11 72	44.6	14	8.66	3.7	0.21	0.	13.3	138	9.5	21.9	[illegible]	4.5	3.6	8.6
46005	20	4 8 73	109.9	43	50.79	9.0	0.35	50.8	2.2	76	93.8	85.4	60.2	3.0	6.4	14.1
46005	21	13 9 73	49.2	15	25.69	2.4	0.50	25.2	8.7	105	[illegible]	51.7	70.2	4.0	2.1	14.3
46005	22	10 11 74	45.5	19	43.92	3.6	1.20	0.	8.3	133	38.6	79.6	62.4	3.6	4.0	7.8
46005	23	3 8 74	43.6	21	13.25	4.0	0.46	28.7	0.9	97	[illegible]	30.9	49.0	2.5	3.3	16.1
46802	4	12 11 64	45.8	13	14.33	4.2	0.15	0.	0.4	125	25.3	55.2	59.0	2.3	3.4	12.1
46802	6	16 11 65	47.6	11	24.54	2.7	0.88	0.	19.8	144	27.1	56.9	•	•	•	•
46802	7	28 11 65	36.4	9	22.01	3.5	0.37	0.	9.7	134	26.9	74.0	66.3	3.2	3.2	10.5
46802	8	28 12 65	38.4	13	13.56	4.4	0.09	0.	1.9	126	24.6	64.1	54.1	2.0	4.0	12.5
46802	9	24 1 66	45.4	15	16.03	5.2	0.10	0.	3.7	128	33.1	73.0	49.2	3.1	4.6	13.4
46802	10	24 2 66	52.2	15	17.57	1.6	0.79	0.	18.4	143	44.9	72.2	•	•	•	•
46802	11	1 3 66	49.3	15	16.28	3.6	0.22	0.	9.0	134	34.9	70.7	60.0	2.8	3.9	10.6
46802	12	18 1 67	50.1	15	15.03	5.5	0.07	5.5	1.9	121	33.7	67.2	•	•	•	•
46802	13	27 2 67	57.0	23	20.11	3.6	0.69	0.	6.3	131	36.4	63.9	•	•	•	•
46802	15	4 9 67	35.0	7	20.05	1.8	0.37	0.	10.2	135	20.6	58.9	•	•	•	•
46802	16	9 10 67	60.5	38	17.69	7.3	0.21	0.	3.9	128	41.5	68.5	56.7	2.9	3.5	12.6
46802	17	24 6 68	45.1	17	[illegible]	3.8	0.09	1.1	17.3	141	33.2	73.7	62.9	2.8	3.5	10.7
46802	18	27 6 68	45.1	[illegible]	[illegible]	2.2	0.59	0.	28.9	153	34.5	76.4	76.9	2.1	3.0	8.5
46805	1	9 12 61	26.8	[illegible]	[illegible]	1.7	0.51	0.	14.0	139	14.0	52.3	88.5	2.3	2.3	7.9
46805	3	16 11 63	56.4	[illegible]	[illegible]	1.9	0.59	0.	9.3	134	29.7	52.7	98.7	1.8	2.3	6.6
46805	4	5 6 64	21.7	14	[illegible]	1.2	0.49	2.9	4.2	126	11.1	51.0	•	•	•	•
46805	5	12 11 64	53.8	13	[illegible]	3.5	0.25	0.	9.0	134	25.1	46.7	64.7	2.4	3.8	9.6
46805	6	12 1 65	49.9	11	[illegible]	1.5	0.86	0.	7.5	132	26.9	53.9	•	•	•	•
46805	7	12 7 65	52.1	17	[illegible]	2.9	1.05	0.	50.5	175	23.6	45.2	60.8	1.7	2.7	13.0
46805	8	16 11 65	23.2	7	5.34	1.7	0.57	0.	9.0	134	11.3	48.8	79.3	2.0	2.9	8.3
46805	9	28 11 65	44.1	9	7.75	3.0	0.65	0.	11.4	136	19.8	44.8	64.7	2.3	3.1	10.9
47007	1	12 1 65	28.2	19	20.08	4.8	2.44	0.	4.6	129	9.0	31.8	46.4	4.6	4.8	14.5
47007	3	10 11 65	38.5	17	18.79	4.2	1.75	0.	10.6	135	8.1	21.1	41.2	6.2	5.5	16.0
47007	4	28 11 65	35.9	22	25.06	4.3	3.70	0.	7.7	132	11.6	32.3	•	•	•	•

CATCH NO	EV NO	DATE OF STORM	RAINFALL TOTAL (MM)	RAINFALL DURN (H)	PEAK FLOW (CUMECS)	LAG (H)	ANSF (CUMECS)	SMD (MM)	APIS (MM)	CWI (MM)	RUNOFF (MM)	RUNOFF %	1-HOUR UNIT HYDROGRAPH UH PEAK (CUMECS PER 100 SQ KMS)	TIME TO PEAK (H)	WIDTH AT 0.5 PEAK (H)	UH TIME BASE (H)
47007	5	17 12 65	48.1	41	20.81	9.6	5.80	0.	16.6	141	27.8	57.8	27.7	4.5	7.0	26.1
47007	6	22 12 65	26.1	14	21.58	6.1	5.03	0.	9.0	133	9.9	38.1	36.5	3.5	6.1	18.4
47007	7	28 12 65	33.1	17	21.78	5.7	3.12	0.	0.8	125	11.1	33.4	36.7	5.6	6.1	18.1
47007	8	24 1 66	38.6	15	19.11	6.3	2.01	0.	1.9	126	8.9	23.1	43.5	4.2	5.0	15.6
47007	10	2 3 66	26.7	14	21.88	5.0	3.80	0.	9.4	134	10.4	39.0	41.5	4.8	5.3	16.3
47007	11	5 8 66	53.3	21	21.95	4.7	0.91	2.6	4.8	127	9.4	17.5	41.1	6.0	5.8	15.6
47007	12	22 10 66	44.1	11	22.00	5.7	2.96	0.8	3.0	127	10.0	22.7	38.0	6.0	[illegible]	17.2
47007	13	20 2 67	24.5	11	20.48	4.3	4.37	0.	19.3	144	8.4	34.4	36.0	5.4	6.7	18.3
47007	15	24 6 68	33.5	17	19.06	6.9	1.83	0.	14.5	139	9.3	27.4	35.5	4.0	6.3	18.8
47007	16	27 6 68	53.0	11	23.31	7.1	4.88	0.4	10.2	144	17.6	33.3	28.2	4.2	8.6	22.3
47008	2	12 1 72	23.4	9	30.42	5.7	4.17	0.	16.6	141	9.4	40.0	•	•	•	•
47008	4	30 1 72	34.8	25	38.90	14.1	3.41	0.	5.6	130	20.6	59.1	•	•	•	•
47008	6	22 5 73	19.4	19	15.32	7.6	0.85	9.8	1.3	116	4.1	21.2	•	•	•	•
47008	7	15 12 73	10.1	18	11.07	5.0	2.78	0.	2.6	127	2.7	[illegible]	•	•	•	•
47008	8	29 12 73	9.1	9	9.96	[illegible]	2.23	0.	1.1	126	1.5	16.4	•	•	•	•
47008	10	25 1 74	29.4	29	41.01	[illegible]	1.15	[illegible]	4.2	129	12.0	40.8	•	•	•	•
47008	14	13 9 75	37.8	15	5.21	3.9	[illegible]	[illegible]	7.4	66	1.9	5.0	•	•	•	•
47011	1	16 6 71	24.5	12	16.35	3.7	[illegible]	[illegible]	1.3	111	3.8	11.6	50.5	4.2	4.7	12.6
47011	2	15 10 71	36.2	20	16.94	6.7	0.67	53.4	[illegible]	78	7.2	19.8	28.3	7.9	8.8	21.7
47011	4	18 12 71	38.3	31	18.66	4.9	1.46	0.	0.2	125	6.1	15.9	•	•	•	•
47011	5	23 5 72	26.4	9	31.73	3.1	3.40	1.1	5.7	129	8.1	30.8	43.0	3.9	6.0	13.9
47011	6	6 6 72	30.3	18	22.89	7.1	2.48	1.7	3.6	126	8.3	27.3	•	•	•	•
47011	7	[illegible]	[illegible]	21	[illegible]	[illegible]	[illegible]	[illegible]	4.7	127	6.3	23.6	39.5	4.6	6.7	14.8
47011	8	1 4 73	[illegible]	13	13.65	6.5	1.20	2.4	1.5	123	5.2	17.0	39.7	7.5	5.9	16.2
47011	9	4 8 73	70.4	43	26.55	10.1	0.99	27.9	2.3	99	21.4	30.4	•	•	•	•
47011	12	3 1 74	46.7	27	40.40	3.2	4.69	0.	5.1	[illegible]	25.3	54.2	•	•	•	•
47011	14	26 [illegible] 74	39.1	22	22.25	4.7	3.40	0.	[illegible]	[illegible]	[illegible]	22.0	•	•	•	•
47011	15	17 10 74	29.7	15	16.19	4.1	2.76	0.	[illegible]	127	7.9	26.5	•	•	•	•
47011	16	12 11 74	29.5	21	27.10	6.8	4.09	0.	9.0	136	14.7	29.7	31.1	6.4	7.9	20.2
47011	17	21 12 74	19.4	10	26.13	5.3	3.64	0.	5.1	130	9.4	49.2	•	•	•	•
48004	1	17 [illegible]	36.2	22	14.00	8.2	2.05	0.	13.2	138	17.1	47.0	35.4	4.0	5.7	20.0
48004	2	11 2 [illegible]	28.9	24	8.03	6.9	1.48	0.	3.2	120	11.6	40.1	30.6	6.8	7.4	21.5
48004	3	20 5 [illegible]	46.4	27	7.23	13.8	0.56	35.6	12.1	101	12.3	26.6	27.2	8.5	8.0	24.9
48004	4	6 11 [illegible]	31.0	24	4.26	10.3	0.52	0.	5.7	133	[illegible]	21.4	22.5	[illegible]	9.4	30.6
48004	5	17 6 [illegible]	39.8	50	3.74	[illegible]	0.29	28.6	[illegible]	90	[illegible]	[illegible]	20.0	[illegible]	9.0	37.6
48004	7	11 6 [illegible]	38.0	33	5.01	13.6	[illegible]	[illegible]	3.1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	37.6
48004	[illegible]	30 11 [illegible]	34.6	33	3.08	7.0	1.05	0.	5.2	130	10.1	29.3	[illegible]	6.0	9.0	28.3
48004	9	[illegible] 11 [illegible]	61.8	[illegible]	14.85	11.0	0.59	0.	1.9	126	21.0	34.0	[illegible]	[illegible]	8.3	21.8
48004	10	26 9 [illegible]	40.8	23	14.77	10.2	1.33	0.7	11.1	135	[illegible]	47.5	35.6	7.5	5.9	19.4
48004	11	17 10 [illegible]	40.4	20	7.58	8.9	[illegible]	0.	3.2	128	13.1	32.5	25.5	6.2	[illegible]	25.4
48004	12	12 11 [illegible]	30.2	14	12.32	6.4	[illegible]	0.	9.5	134	15.4	51.1	37.0	7.7	6.5	17.1
48005	2	25 6 [illegible]	23.7	13	2.29	6.2	0.17	0.	3.0	128	2.2	9.5	41.3	3.0	[illegible]	16.7
48005	3	28 7 [illegible]	86.1	13	2.71	7.5	[illegible]	3.6	0.1	[illegible]	5.1	5.9	33.0	8.1	7.9	17.9
48005	[illegible]	18 12 [illegible]	17.5	7	1.56	5.1	0.31	0.	1.1	120	1.1	6.4	48.6	4.4	4.8	13.3
48005	6	7 8 [illegible]	22.6	6	1.28	2.0	0.15	44.6	6.3	86	0.9	3.8	53.2	3.0	4.4	12.1
48005	9	[illegible]	62.0	30	4.24	[illegible]	[illegible]	[illegible]	2.2	127	6.4	20.0	40.4	[illegible]	[illegible]	[illegible]
48005	11	[illegible]	[illegible]	10	2.32	[illegible]	0.48	0.	2.5	127	2.1	12.0	50.5	4.0	4.5	12.6
48005	13	30 1 75	12.4	11	4.42	4.3	1.17	0.	7.0	131	2.4	19.1	59.6	[illegible]	4.1	10.5
48005	14	10 [illegible] 75	16.4	7	2.83	1.6	0.29	0.	2.9	127	1.8	11.1	60.0	3.1	4.2	10.1
48005	15	16 8 75	20.3	10	1.19	4.0	0.13	96.2	10.1	[illegible]	1.3	6.4	39.8	4.4	5.8	16.3
48005	16	13 9 75	55.0	20	[illegible]	3.2	0.15	76.8	4.4	[illegible]	4.4	8.3	43.1	3.3	4.3	17.2
48009	2	29 11 73	61.9	25	8.70	7.9	1.79	0.	9.8	134	24.9	40.2	•	•	•	•
48009	4	[illegible] 1 7[illegible]	32.3	25	5.64	6.1	1.39	0.	[illegible]	131	14.3	34.6	21.5	10.8	10.4	30.9
48009	5	31 1 72	36.5	13	6.76	9.9	[illegible]	0.2	[illegible]	[illegible]	11.8	[illegible]	•	•	•	•
48009	6	11 6 72	39.3	36	4.83	13.8	0.75	[illegible]	[illegible]	122	[illegible]	37.9	15.0	9.8	13.4	47.3
48009	8	4 8 73	30.3	43	5.53	19.0	0.27	61.6	7.3	90	[illegible]	27.2	•	•	•	•
48009	9	17 10 74	42.6	21	7.47	5.9	0.97	0.	3.5	128	[illegible]	36.8	21.0	9.5	11.0	31.0
48009	10	12 11 74	32.3	19	10.55	3.4	1.68	[illegible]	10.3	135	[illegible]	30.7	31.0	11.3	8.0	19.9
49003	1	20 12 66	35.8	21	14.10	5.9	1.56	0.	14.4	139	[illegible]	52.4	37.0	4.2	6.0	18.1
49003	2	22 1 67	35.9	9	14.32	5.0	1.05	0.	[illegible]	134	[illegible]	53.4	38.1	3.3	6.2	16.8
49003	3	27 2 67	42.0	22	14.74	[illegible]	[illegible]	0.	[illegible]	129	23.1	54.9	38.5	6.3	5.3	18.1
49003	4	15 [illegible]	[illegible]	29	16.99	5.8	[illegible]	[illegible]	14.3	139	[illegible]	74.8	•	•	•	•
49003	6	17 12 67	61.6	29	13.70	8.5	[illegible]	[illegible]	1.4	126	30.9	50.1	•	•	•	•
49003	7	21 12 68	27.8	19	10.14	5.6	0.78	0.	4.9	129	13.5	48.6	30.0	7.7	7.2	22.7
49003	8	23 12 68	27.5	42	18.93	13.9	0.56	0.	9.1	136	53.3	68.5	35.0	6.6	5.5	18.8
49003	9	27 7 69	113.5	26	11.52	9.1	0.17	93.0	5.1	31	18.2	10.0	31.7	6.7	6.9	21.3
49003	10	16 1 70	47.5	29	17.72	9.0	0.87	0.	12.8	137	24.7	51.9	37.0	5.0	5.6	18.9
49003	11	1 11 70	44.9	16	16.52	5.6	0.47	0.	7.2	132	23.7	50.5	33.0	4.2	6.1	21.5
49003	12	29 11 71	[illegible]	25	13.00	3.6	4.79	0.	9.8	134	10.5	16.3	36.0	6.8	8.1	14.7
49003	13	23 1 72	36.4	26	11.43	5.9	0.19	0.	6.6	131	18.9	52.0	34.0	7.7	6.3	20.1
49003	14	14 1 72	26.9	21	10.32	6.0	3.59	0.	10.0	135	17.2	66.0	36.8	5.8	5.0	20.2
49003	15	11 11 72	34.8	26	10.29	5.9	0.31	0.	6.1	131	16.4	47.1	32.0	4.2	6.7	21.6
49003	16	1 4 73	36.0	14	5.78	7.9	0.08	11.9	2.3	115	9.3	25.9	38.1	6.2	6.6	16.0
49003	18	4 9 74	30.5	15	10.99	7.1	0.62	43.3	17.4	99	17.7	37.9	32.5	5.6	7.0	20.2
49003	[illegible]	13 9 75	[illegible]	14	8.13	6.7	0.11	90.2	6.9	41	10.7	20.1	39.3	5.4	5.5	17.3
49003	[illegible]	17 10 74	[illegible]	15	15.79	5.8	0.32	0.	2.3	127	27.3	60.7	37.5	4.0	[illegible]	[illegible]
51002	[illegible]	4 9 74	22.5	13	3.17	5.0	0.92	67.3	22.3	80	3.7	14.6	32.0	5.5	7.0	20.8
51002	4	22 9 74	37.7	22	3.39	5.5	0.54	90.5	6.3	40	5.8	13.4	32.6	4.0	6.5	21.3
51002	5	26 9 74	57.6	24	5.96	7.2	1.22	0.6	12.5	136	10.9	18.9	29.5	3.0	5.5	26.7
51002	6	10 11 74	19.5	11	2.90	4.1	0.84	6.2	6.2	124	2.8	14.5	31.7	6.0	8.0	19.6
51002	[illegible]	19 1 75	29.0	20	4.51	6.1	[illegible]	0.	3.5	128	4.0	15.9	31.5	4.4	6.5	22.5
51002	10	30 1 75	13.2	6	3.97	3.1	1.70	0.	11.7	136	1.9	16.7	42.5	3.5	5.6	15.0
51002	11	1 4 75	16.8	16	1.25	[illegible]	0.38	43.0	0.6	57	1.5	9.1	25.2	5.5	8.0	23.4
51002	13	30 11 75	31.6	18	7.67	3.6	1.19	15.7	6.1	115	8.9	17.3	•	•	•	•
52004	1	22 10 66	32.9	10	22.98	8.0	1.58	46.8	5.7	79	11.1	33.7	25.0	7.4	10.2	24.1
52004	4	20 2 67	15.9	13	21.26	4.2	3.89	0.4	12.8	137	6.5	47.0	36.6	5.9	6.6	17.2
52004	5	15 10 67	33.4	22	19.19	10.4	1.17	32.1	5.7	98	12.3	36.8	29.3	6.7	12.1	38.0
52004	6	30 10 67	28.9	20	22.09	9.9	1.82	22.0	4.0	107	14.7	50.8	31.6	9.0	12.4	26.7
52004	8	27 6 68	19.6	9	18.93	6.4	1.36	35.2	6.9	96	8.4	42.8	26.5	7.3	7.7	27.6
52004	9	10 7 68	54.5	21	21.91	6.9	1.21	35.2	6.9	96	19.7	36.1	18.7	6.2	14.0	33.5
52004	10	21 12 68	20.0	7	25.00	7.3	2.93	0.	5.6	130	8.8	44.1	30.0	7.4	9.8	27.5
52004	11	24 12 68	31.8	31	20.82	11.5	2.56	0.	4.0	129	14.2	44.7	25.4	5.6	9.0	21.8
52004	13	12 3 69	19.8	11	20.74	6.5	2.07	[illegible]	11.0	135	7.4	37.3	33.0	4.5	7.2	19.3
52004	14	28 [illegible] 69	54.5	21	21.82	12.0	0.53	115.9	4.3	13	13.2	15.6	•	•	•	•

CATCH NO	EV NO	DATE OF STORM	RAINFALL TOTAL (MM)	RAINFALL DURN (H)	PEAK FLOW (CUMECS)	LAG (H)	ANSF (CUMECS)	SMD (MM)	APIS (MM)	CWI (MM)	RUNOFF (MM)	RUNOFF %	1-HOUR UNIT HYDROGRAPH UH PEAK (CUMECS PER 100 SQ KMS)	TIME TO PEAK (H)	WIDTH AT 0.5 PEAK (H)	UH TIME BASE (H)
52005	3	19 1 65	24.0	12	41.89	9.5	7.37	8.7	6.3	122	7.9	32.9	20.7	9.2	9.9	[illegible]
52005	4	28 11 65	25.5	19	30.66	8.0	5.74	2.4	3.9	126	6.7	26.2	20.9	5.2	11.0	31.2
52005	5	8 12 65	32.0	46	34.35	14.3	6.03	0.1	2.6	127	14.5	45.4	•	•	•	•
52005	6	24 2 66	24.5	21	37.31	11.2	6.12	0.	6.2	131	8.3	34.0	24.6	11.0	8.6	[illegible]
52005	7	17 4 66	39.1	53	45.99	13.4	8.27	1.2	6.8	130	15.6	39.9	•	•	•	•
52005	8	20 2 67	17.4	11	33.72	8.6	8.50	0.	12.0	137	6.6	38.1	20.0	9.5	15.0	29.6
52005	9	30 10 67	30.2	22	26.58	10.2	4.49	22.1	8.1	111	7.9	26.2	16.3	10.8	13.8	40.6
52005	10	8 1 68	32.0	24	42.41	9.5	7.38	0.	4.1	129	11.0	34.3	22.0	9.6	11.5	27.5
52005	11	9 7 68	68.8	30	111.63	16.4	2.16	23.6	2.6	103	39.0	56.7	•	•	•	•
52005	13	27 7 69	111.8	29	74.10	15.7	1.16	120.5	0.	4	16.0	14.3	27.9	9.8	7.3	21.3
52006	1	1 8 65	38.6	17	29.67	10.3	1.12	32.7	1.9	94	8.8	22.8	17.1	9.9	13.1	38.8
52006	2	28 11 65	33.7	26	41.82	5.4	6.15	0.1	3.8	128	12.2	36.3	15.9	10.6	13.3	43.3
52006	3	22 12 65	18.2	13	33.11	13.6	5.32	0.	1.6	126	7.2	39.5	•	•	•	•
52006	5	24 2 66	33.0	21	45.37	12.4	9.37	0.	6.9	131	13.2	39.9	16.8	11.6	13.0	40.2
52006	6	22 10 66	30.6	8	32.65	12.7	4.38	1.7	2.3	125	10.4	33.9	14.7	11.3	15.0	45.6
52006	7	4 11 66	58.5	20	46.45	9.9	5.39	4.7	0.1	120	20.2	34.4	15.5	11.9	13.5	44.7
52006	8	22 1 67	20.3	24	31.91	11.0	6.08	0.	5.1	130	10.1	49.7	16.5	14.0	12.7	42.0
52006	9	27 2 67	20.0	21	32.90	11.4	4.18	0.	3.3	128	9.9	49.3	15.8	13.3	13.9	42.6
52006	10	3 5 67	48.2	18	38.27	10.8	1.96	32.3	0.	92	9.0	18.7	21.8	8.8	10.3	30.4
52006	11	15 10 67	34.0	36	37.35	15.1	6.22	1.0	10.6	134	9.6	28.2	20.0	10.9	11.5	32.6
52006	12	9 7 68	53.7	29	35.75	8.3	1.85	25.5	2.8	102	10.1	18.7	18.0	9.4	14.6	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	7.01	0.	4.7	129	11.7	40.4	15.5	[illegible]	[illegible]	38.9
52006	15	12 3 69	19.7	10	39.81	11.1	6.72	0.	8.9	133	6.4	32.4	[illegible]	12.5	9.7	23.9
52010	1	22 10 66	26.0	9	40.51	9.7	2.60	1.7	2.8	126	11.6	44.7	25.5	10.0	[illegible]	23.6
52010	2	4 11 66	63.4	19	75.59	11.9	1.15	4.7	0.0	120	33.4	[illegible]	21.6	11.0	13.5	24.5
52010	3	28 12 66	18.3	14	[illegible]	[illegible]	3.13	0.	4.2	129	7.9	42.9	26.5	10.7	8.5	25.0
52010	4	15 10 67	32.0	39	[illegible]		3.06	5.2	12.7	132	14.2	[illegible]	•	•	•	•
52010	5	5 1 68	27.9	25	[illegible]		3.03	0.	4.8	129	13.4	48.1	[illegible]	11.2	11.0	29.7
52010	6	27 6 68	21.9	9	[illegible]		2.04	10.8	8.3	122	9.6	43.9	25.8	10.4	9.0	25.1
52010	7	10 7 68	46.3	19	76.00	[illegible]	5.59	23.3	4.4	106	32.7	70.7	19.5	11.4	13.4	30.2
52010	8	24 12 68	24.8	25	28.46	13.3	2.90	0.	3.9	128	12.3	49.5	•	•	•	•
52010	9	12 3 69	21.4	23	21.99	11.0	2.88	0.	8.1	133	7.7	36.1	22.5	10.4	9.0	31.4
52016	1	3 8 74	47.2	19	0.55	4.5	0.09	106.9	0.1	18	0.9	1.9	32.3	3.0	6.5	[illegible]
52016	2	26 9 74	40.1	24	1.54	5.2	0.23	64.7	6.8	67	4.4	11.0	34.0	[illegible]	4.5	23.7
52016	3	21 11 74	12.8	12	1.59	3.9	0.52	0.	7.3	132	1.6	[illegible]	[illegible]	4.8	6.5	16.8
52016	4	26 12 74	15.9	8	1.13	3.7	0.39	0.	7.0	132	1.5	9.3	26.6	3.6	9.4	23.0
52016	6	26 1 75	11.9	14	1.20	3.5	0.45	0.	3.5	128	1.1	9.5	41.4	3.3	6.0	14.9
52016	7	6 3 75	8.9	5	0.78	3.9	0.26	0.2	3.2	128	0.7	7.6	41.6	5.0	5.6	15.5
52016	8	30 11 75	28.8	27	0.64	6.1	0.09	27.9	7.3	104	1.2	4.3	31.0	6.5	8.0	19.9
52020	1	22 10 66	31.9	9	18.32	2.7	0.57	1.7	2.3	123	19.2	60.1	77.4	3.2	3.5	7.4
52020	4	15 10 67	32.6	20	13.22	7.0	0.69	0.	9.9	136	19.5	59.8	55.4	3.7	4.3	11.5
52020	10	21 12 68	15.2	7	15.13	3.3	0.69	0.	5.1	130	15.0	82.2	72.0	3.2	3.6	8.2
53005	2	1 8 65	27.1	21	15.41	9.4	3.86	7.1	8.8	126	4.1	15.3	20.5	8.9	9.1	36.0
53005	3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	16.5	[illegible]	[illegible]	[illegible]
53005	4	22 10 66	21.2	8	8.61	5.7	2.13	21.9	1.6	104	2.1	10.0	22.0	8.2	9.5	31.5
53005	5	4 11 66	55.0	18	30.91	12.3	1.06	7.9	0.	117	15.7	28.6	16.7	12.1	14.9	36.8
53005	7	8 1 68	22.8	22	17.16	8.2	4.24	0.	6.7	129	5.5	24.0	17.3	10.7	13.1	38.1
53005	8	10 7 68	79.5	21	55.45	11.0	2.84	22.1	4.2	107	22.6	28.5	17.7	10.0	14.1	34.6
53005	9	26 [illegible] 68	23.7	26	9.64	13.2	2.18	0.2	5.8	130	4.1	17.2	15.5	16.1	12.8	46.1
53005	10	1 11 68	13.5	8	5.07	7.1	3.48	0.	5.1	130	1.4	10.7	21.8	9.2	10.5	30.0
53005	11	25 11 68	21.5	22	10.19	14.4	2.38	0.	3.4	128	4.0	18.1	17.6	7.5	10.1	45.0
53005	13	21 12 68	18.6	16	17.22	9.9	4.17	0.	5.5	130	5.0	26.7	20.4	6.7	8.0	38.5
53005	14	24 12 68	20.6	25	13.31	12.3	4.73	0.	5.6	130	5.0	24.1	16.3	9.6	12.3	42.6
53005	15	27 7 69	71.1	32	7.68	12.1	0.74	106.1	0.	18	2.5	3.5	•	•	•	•
53007	5	31 5 64	29.2	15	36.67	11.0	5.45	4.9	12.7	132	7.6	26.1	17.0	14.0	14.7	36.0
53007	8	1 8 65	31.6	19	83.55	10.9	6.43	5.9	4.8	123	15.5	49.1	21.4	10.2	12.0	28.0
53007	9	6 11 65	30.0	28	24.86	10.7	2.58	8.7	0.1	116	5.9	19.6	•	•	•	•
53007	10	28 11 65	25.8	27	43.65	9.8	6.38	0.1	2.8	127	8.5	32.9	19.8	10.7	11.2	33.8
53007	11	7 5 66	22.0	19	26.16	10.4	3.75	10.3	6.2	120	5.4	24.6	26.0	11.4	11.0	20.8
53007	12	14 10 66	22.1	10	25.14	10.3	2.99	26.0	2.8	101	4.3	19.4	21.5	10.1	10.4	30.9
53007	13	22 10 66	21.5	8	33.38	11.6	4.83	1.7	2.3	125	6.3	29.1	19.8	11.4	11.2	33.8
53007	14	4 11 66	56.7	21	86.92	13.1	2.08	4.5	0.1	120	21.1	37.2	20.5	11.0	12.0	30.2
53007	16	27 2 67	23.7	21	32.54	6.5	7.52	0.	2.8	127	7.0	29.5	•	•	•	•
53007	17	1 4 67	23.9	20	23.22	12.1	3.52	8.0	0.3	117	5.0	20.9	18.0	8.6	12.4	37.0
53007	23	10 7 68	64.8	20	116.31	8.0	5.07	23.0	6.7	108	22.7	35.0	20.5	8.3	12.7	28.8
53007	24	7 10 68	25.4	17	24.63	10.8	3.08	5.1	0.	119	4.6	18.0	18.0	10.6	12.8	36.2
53007	25	1 11 68	14.9	14	24.63	11.2	5.17	0.	5.1	130	3.6	24.5	20.5	10.9	11.5	31.2
53007	26	24 12 68	21.9	24	37.62	10.3	7.27	0.	4.0	129	8.2	37.4	19.5	9.8	12.2	32.6
53008	2	28 11 65	21.3	17	20.75	9.7	6.02	0.1	2.5	127	4.2	19.5	•	•	•	•
53008	3	8 12 65	29.0	32	32.63	18.9	7.26	0.	1.5	126	7.0	24.0	•	•	•	•
53008	4	16 12 65	57.8	51	62.36	26.3	11.28	0.	5.0	129	33.7	58.3	•	•	•	•
53008	5	30 12 66	14.9	14	19.47	9.9	6.37	0.	5.7	130	3.3	22.1	•	•	•	•
53008	6	19 2 67	23.5	23	41.32	11.4	10.85	0.	12.6	137	8.1	34.6	•	•	•	•
53008	7	27 2 67	30.7	20	42.75	14.6	7.45	0.	1.6	126	9.6	31.3	•	•	•	•
53008	9	9 7 68	101.3	28	105.34	13.4	5.92	19.5	2.3	107	24.0	23.7	•	•	•	•
53008	10	1 11 68	12.2	14	19.04	10.1	6.81	0.	3.7	128	2.6	21.6	•	•	•	•
53008	11	24 12 68	21.1	23	32.99	15.4	8.38	0.	4.7	129	8.2	29.0	•	•	•	•
53008	12	25 5 69	35.2	23	50.54	10.2	5.01	3.6	4.4	126	10.9	30.9	•	•	•	•
53009	1	22 10 66	20.3	8	4.02	7.7	1.37	21.9	1.9	104	1.8	8.0	22.7	7.8	10.1	28.8
53009	2	4 11 66	63.1	20	14.48	9.7	2.16	7.9	0.1	117	15.2	24.2	18.1	9.5	13.0	35.4
53009	3	1 4 67	29.5	23	3.80	10.7	1.42	4.0	0.3	121	2.2	7.5	18.5	6.8	9.9	40.3
53009	4	8 1 68	24.4	22	8.52	8.9	2.42	0.	5.7	130	5.4	22.2	17.4	9.4	12.7	38.5
53009	6	28 9 68	23.0	26	4.02	12.5	1.53	0.2	7.5	132	[illegible]	14.8	•	•	•	•
53009	7	1 11 68	15.2	12	4.42	5.8	2.21	0.	4.2	129	1.4	[illegible]	•	•	•	•
53009	8	25 11 68	21.9	23	4.73	14.2	1.63	0.	5.4	130	[illegible]	[illegible]	13.6	7.5	13.3	55.2
53009	9	21 12 68	15.0	6	9.16	6.7	2.69	0.	5.1	130	3.2	[illegible]	30.0	5.8	7.5	22.1
53009	10	24 12 68	18.3	25	6.66	12.0	2.94	[illegible]	3.4	128	4.2	[illegible]	[illegible]	•	•	[illegible]
54004	3	23 1 60	38.4	17	45.78	15.2	[illegible]	0.	3.8	128	14.7	[illegible]	13.0	[illegible]	18.2	[illegible]
54004	4	27 1 60	32.1	28	38.09	11.3	7.24	0.	17.9	142	14.6	[illegible]	11.5	12.5	17.2	[illegible]
54004	5	16 11 60	17.8	9	22.40	13.8	5.10	0.	1.3	126	7.9	44.5	9.9	11.5	29.3	[illegible]
54004	6	3 12 60	34.7	21	45.36	15.4	3.19	0.	0.5	125	19.1	55.0	10.6	13.5	22.3	[illegible]
54004	7	8 12 65	23.8	27	[illegible]	10.7	5.49	0.	2.3	127	10.0	42.2	10.3	10.3	25.0	58.0

CATCH NO	EV NO	DATE OF STORM	RAINFALL TOTAL (MM)	RAINFALL DURN (H)	PEAK FLOW (CUMECS)	LAG (H)	ANSF (CUMECS)	SMD (MM)	APIS (MM)	CWI (MM)	RUNOFF (MM)	RUNOFF %	1-HOUR UNIT HYDROGRAPH: UM PEAK (CUMECS PER 100 SQ KMS)	TIME TO PEAK (H)	WIDTH AT 0.5 PEAK (H)	UM TIME BASE (H)
54004	8	22 12 65	20.1	20	23.65	10.7	5.47	0.	1.4	126	10.0	49.6	9.3	13.0	22.0	75.6
54004	9	18 2 66	40.5	63	32.11	20.2	4.23	1.0	0.3	124	22.0	54.3	•	•	•	•
54004	10	29 8 66	42.4	19	25.31	3.2	5.58	62.2	6.0	68	7.4	17.5	•	•	•	•
54004	11	9 12 66	15.7	15	24.36	12.8	7.25	0.	4.0	129	6.5	41.3	11.0	13.0	20.2	60.7
54004	12	8 3 67	23.5	22	22.51	12.1	4.23	0.	2.0	127	8.8	37.1	10.5	11.0	22.5	60.9
54004	14	10 7 68	54.4	15	42.31	19.0	3.36	10.7	4.8	119	21.1	38.7	•	•	•	•
54004	15	12 3 69	29.2	26	35.85	17.2	3.06	5.0	3.3	123	16.3	55.9	10.0	13.0	23.0	65.2
54004	16	5 5 69	36.2	12	34.79	13.6	3.55	20.4	0.5	105	12.9	35.7	10.8	15.0	23.0	57.0
54006	9	10 7 68	36.4	21	19.37	33.4	2.82	10.0	5.8	120	5.7	15.8	•	•	•	•
54006	10	12 3 69	28.3	25	20.07	24.5	2.38	0.	2.4	127	6.7	23.7	9.7	24.7	22.1	70.4
54006	11	5 5 69	35.7	13	21.61	20.0	2.83	19.5	4.5	110	6.1	17.0	10.9	21.0	22.0	58.0
54006	12	2 8 69	28.7	22	18.04	19.3	2.95	65.8	9.9	69	5.2	18.1	•	•	•	•
54006	14	27 [illegible]	44.9	25	[illegible]	24.0	3.30	0.2	5.8	130	13.1	29.1	6.8	26.2	35.0	93.5
54010	3	21 1 59	22.1	26	37.02	19.7	9.54	0.	8.7	133	9.2	41.6	•	•	•	•
54010	4	23 1 60	34.0	35	49.61	13.6	5.06	0.	4.8	129	13.1	38.6	•	•	•	•
54010	5	27 7 60	27.0	28	47.66	15.3	5.28	0.	3.9	128	11.0	40.6	•	•	•	•
54010	6	16 11 60	18.5	9	34.49	19.3	4.88	0.	1.9	126	7.8	41.4	•	•	•	•
54010	10	14 5 67	29.3	32	43.56	16.1	1.92	7.3	6.4	126	13.1	44.8	•	•	•	•
54010	13	12 3 69	24.9	33	33.86	21.0	3.52	1.2	3.3	127	9.8	39.4	12.0	21.3	18.0	56.7
54011	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	13.0	1.10	47.1	1.4	79	4.3	12.2	11.5	13.4	20.6	55.5
54011	5	24 9 65	25.3	37	11.83	21.8	2.70	0.	5.2	130	5.8	22.9	•	•	•	•
54011	6	23 11 65	18.5	15	15.07	15.6	1.09	0.	2.1	127	7.1	38.2	12.6	14.0	19.4	49.5
54011	7	8 12 65	20.2	19	30.27	11.9	2.05	0.	1.8	126	11.0	54.5	•	•	•	•
54011	8	22 12 65	15.5	22	11.70	14.9	1.62	0.	1.4	126	4.9	31.4	14.0	11.3	16.8	45.8
54011	9	31 12 65	17.7	31	16.37	12.8	2.19	0.	2.4	127	7.1	40.0	14.5	12.5	16.0	44.7
54011	10	7 5 66	20.8	31	12.96	22.9	0.96	6.4	4.3	122	4.1	19.5	19.0	12.3	12.5	33.5
54011	11	23 2 67	11.0	7	15.20	13.5	1.11	0.	6.8	131	4.9	44.6	17.0	14.0	12.5	39.8
54011	12	8 3 67	27.0	30	18.17	14.2	1.02	0.	2.1	127	9.0	33.2	14.0	11.5	19.0	41.4
54011	13	27 5 67	13.2	10	16.77	14.3	2.68	0.	7.9	132	4.4	33.0	•	•	•	•
54011	14	9 7 68	51.0	26	36.77	15.8	1.53	53.2	2.7	74	15.2	29.8	14.5	16.5	16.0	44.7
54011	16	5 5 69	31.3	13	35.04	12.4	0.97	26.0	2.0	100	11.8	37.7	18.0	12.0	13.5	34.8
54011	18	25 5 69	16.6	6	36.16	13.3	3.31	3.6	16.0	137	10.8	65.1	•	•	•	•
54011	19	28 11 70	27.6	37	34.03	11.1	0.66	1.0	1.8	125	7.4	27.0	14.3	11.3	13.6	50.6
54011	21	12 1 72	22.2	25	[illegible]	[illegible]	1.01	0.	3.7	130	6.5	38.2	15.5	14.0	14.5	42.7
54011	22	2 2 72	21.6	45	18.76	15.9	3.92	0.	2.9	127	4.4	20.2	21.5	11.0	11.8	28.1
54016	1	20 [illegible] 52	13.6	16	10.16	22.5	(2.96)	0.4	2.8	127	3.4	25.2	9.1	22.5	26.4	69.4
54016	2	29 3 63	12.7	22	7.42	24.6	1.92	4.9	3.0	123	3.2	25.2	•	•	•	•
54016	3	24 11 63	29.0	36	11.37	31.6	2.13	47.5	1.4	79	7.1	24.6	6.1	30.5	38.4	105.6
54016	5	12 12 64	25.2	20	6.98	[illegible]	1.05	52.3	[illegible]	86	3.4	13.6	7.4	23.5	31.3	88.6
54016	8	8 3 67	21.5	34	10.37	[illegible]	2.50	3.3	0.2	121	4.0	27.8	•	•	•	•
54016	9	15 10 67	36.8	48	10.25	27.1	1.76	43.8	3.5	84	7.0	19.1	5.7	24.5	41.0	111.3
54016	12	26 5 68	15.5	28	11.30	19.7	3.56	9.1	18.3	134	3.7	23.8	•	•	•	•
54019	2	23 [illegible] 63	31.7	33	[illegible]	33.1	2.34	10.1	3.8	119	14.2	[illegible]	•	•	•	•
54019	3	17 11 63	35.0	44	12.72	35.2	1.19	6.5	0.3	118	7.7	22.1	•	•	•	•
54019	4	25 3 64	18.1	26	16.83	37.5	2.66	1.4	1.2	124	7.7	42.6	•	•	•	•
54019	6	2 12 65	21.3	32	22.08	40.4	3.11	0.	1.9	126	9.2	43.1	6.0	41.5	37.5	111.1
54019	7	22 12 65	22.4	48	24.35	36.3	6.14	0.	1.3	126	8.1	36.0	•	•	•	•
54019	10	12 11 66	43.7	92	20.16	30.5	1.38	12.2	0.9	113	19.4	44.4	•	•	•	•
54019	11	9 12 66	21.6	56	24.86	36.8	5.60	0.	2.7	127	11.1	51.3	6.7	43.0	36.0	94.0
54019	12	27 2 67	18.2	17	22.25	37.0	2.98	0.	1.3	126	8.2	45.2	7.6	40.0	34.0	[illegible]
54019	13	8 3 67	23.1	49	17.75	41.7	2.03	2.4	1.7	124	9.8	42.3	[illegible]	46.5	39.0	117.5
54019	14	14 5 67	36.2	50	39.04	35.1	2.15	1.6	[illegible]	129	16.7	46.2	•	•	•	•
54019	15	26 5 67	18.9	26	20.24	45.9	4.05	1.3	4.0	127	7.1	37.8	•	•	•	•
54019	17	9 7 68	74.3	24	98.50	29.0	2.09	28.8	2.2	98	28.5	38.7	•	•	•	•
54019	18	1 11 68	36.7	18	35.05	34.5	7.87	0.	3.9	128	8.7	23.8	•	•	•	•
54019	20	12 3 69	27.2	30	33.20	30.2	2.92	1.0	4.3	128	14.0	31.6	•	•	•	•
54019	21	5 5 69	36.2	12	38.90	31.4	1.46	33.7	1.0	92	13.1	36.1	•	•	•	•
54020	1	25 [illegible] 63	22.5	22	9.22	17.0	2.85	33.0	4.6	96	4.4	19.4	•	•	•	•
54020	2	23 3 64	26.5	26	10.46	15.5	7.94	0.	1.3	126	6.1	23.0	•	•	•	•
54020	6	8 3 67	30.5	34	9.07	20.8	4.30	3.3	0.6	122	6.7	22.0	•	•	•	•
54020	7	15 10 67	41.3	56	7.40	17.0	1.76	35.2	4.4	94	6.9	16.6	•	•	•	•
54020	10	5 5 69	32.6	52	10.61	18.7	2.54	5.2	5.3	125	9.4	25.9	•	•	•	•
54022	2	12 5 68	32.9	11	8.07	3.7	0.50	3.6	9.3	130	25.2	47.8	51.4	2.4	3.8	14.1
54022	5	26 6 68	39.6	14	7.65	2.1	0.77	0.	18.4	143	18.3	46.2	57.7	2.4	3.6	12.0
54022	6	2 7 68	31.4	15	3.44	2.7	0.46	0.8	13.3	137	10.5	33.6	47.4	2.0	5.0	13.5
54022	7	19 9 68	68.9	32	7.46	4.9	0.31	1.0	1.2	125	23.6	34.3	48.8	2.4	5.2	16.3
54022	8	28 9 68	39.7	26	6.55	1.1	0.76	0.3	13.6	138	14.3	35.9	•	•	•	•
54022	9	2 10 68	40.0	17	6.95	1.6	0.98	0.	12.5	137	21.1	52.8	53.8	1.6	3.8	[illegible]
54022	10	27 11 68	36.1	15	4.56	3.8	0.27	0.	5.3	130	11.9	35.0	38.4	2.0	3.7	11.6
54022	11	26 11 68	30.0	24	3.53	3.2	0.53	0.	10.6	135	10.7	35.8	68.5	2.8	3.6	15.8
54022	12	19 12 68	33.6	29	4.10	6.1	0.40	0.	6.1	131	18.3	54.6	[illegible]	1.8	2.9	15.6
54022	14	30 3 69	42.5	9	3.05	3.9	1.16	0.	17.9	142	19.0	[illegible]	•	•	•	•
54022	15	10 4 69	39.8	11	5.56	3.3	0.54	0.	15.2	140	16.8	40.9	43.9	2.1	4.8	13.6
54022	16	14 4 69	28.0	13	4.19	3.9	0.46	0.	8.5	133	10.0	35.6	•	•	•	•
54022	17	23 4 69	33.5	13	3.60	2.7	0.46	0.	9.3	134	8.8	26.3	46.6	2.0	3.6	16.7
54022	18	2 6 69	32.8	13	4.31	3.6	0.42	6.7	1.9	120	10.5	32.0	33.2	2.0	2.9	15.1
54022	19	10 9 69	31.2	20	2.56	1.8	0.13	28.3	1.0	97	3.3	10.5	83.8	2.1	2.6	8.2
54022	20	21 9 69	19.3	7	5.46	3.7	0.40	0.	8.3	133	5.7	29.4	[illegible]	2.9	3.1	8.9
54022	21	19 2 70	32.1	16	5.73	4.5	1.14	0.	18.7	141	18.6	57.0	30.3	3.9	[illegible]	19.1
54022	24	15 8 70	54.5	23	8.79	3.9	0.33	2.0	3.2	126	[illegible]	35.0	56.8	1.8	[illegible]	[illegible]
54022	25	9 9 70	49.0	21	[illegible]	2.7	0.74	0.	14.6	139	29.6	46.0	38.4	[illegible]	[illegible]	13.4
54022	26	27 10 70	61.5	25	[illegible]	[illegible]	1.10	0.	22.5	147	34.9	56.8	55.6	[illegible]	[illegible]	13.5
54022	27	1 11 70	60.5	14	11.24	3.8	0.79	0.	31.1	156	20.9	49.3	45.4	[illegible]	3.9	[illegible]
54034	2	2 2 72	25.5	45	8.52	7.1	0.80	0.	2.4	127	10.8	44.1	•	•	•	•
54034	4	8 9 72	45.8	37	2.22	12.2	0.12	94.4	1.6	82	3.0	6.6	•	•	•	•
54034	5	3 5 73	20.3	39	3.60	6.7	0.68	15.7	2.0	111	5.4	26.8	•	•	•	•
54090	1	18 10 73	69.2	17	2.41	2.8	0.06	0.	3.6	130	35.9	63.3	93.3	[illegible]	2.4	7.1
54090	2	14 11 73	41.8	14	1.98	1.7	0.09	0.	22.4	147	21.8	52.2	•	•	•	•
54090	3	14 1 74	72.0	25	2.02	2.8	0.08	0.	10.3	135	35.9	77.7	•	•	•	•
54090	4	16 6 74	20.4	11	[illegible]	0.6	0.04	58.3	11.0	77	11.3	40.0	104.0	[illegible]	3.5	3.7
54090	5	4 9 74	42.5	22	[illegible]	3.9	0.08	69.2	16.3	72	30.5	71.8	116.0	2.0	1.5	6.5
54090	6	21 12 74	33.2	18	[illegible]	2.8	0.15	0.	26.5	151	16.3	47.0	[illegible]	1.1	1.9	6.5
54090	7	21 1 75	103.4	24	2.14	2.8	[illegible]	0.	22.9	147	76.0	73.4	[illegible]	1.1	2.6	8.6

CATCH NO	EV NO	DATE OF STORM	RAINFALL TOTAL (MM)	RAINFALL DURN (H)	PEAK FLOW (CUMECS)	LAG (H)	ANSF (CUMECS)	SMD (MM)	APIS (MM)	CWI (MM)	RUNOFF (MM)	RUNOFF %	1-HOUR UNIT HYDROGRAPH: UM PEAK (CUMECS PER 100 SQ KMS)	TIME TO PEAK (H)	WIDTH AT 0.5 PEAK (H)	UM TIME BASE (H)
54090	8	24 9 75	59.9	34	1.57	3.1	0.05	94.7	10.1	40	60.2	67.0	91.2	1.3	1.6	9.0
54090	9	30 11 75	116.6	31	1.94	1.7	0.07	4.4	7.2	127	88.5	75.9	98.9	1.1	2.1	7.0
54090	10	30 12 75	55.9	25	1.73	5.2	0.04	0.2	1.3	126	59.5	66.9	107.5	1.9	1.7	7.0
54090	11	1 2 76	84.4	25	1.75	2.1	0.06	0.	5.3	130	54.0	75.9	71.1	1.2	2.3	10.9
54090	12	7 7 76	30.3	7	1.18	0.8	0.01	97.1	2.8	30	4.2	13.7	141.4	1.4	1.6	4.8
54090	13	15 8 77	97.6	4	4.40	1.9	0.07	80.1	4.9	49	33.6	34.4	129.4	1.9	1.7	5.1
54090	14	9 9 77	73.6	17	1.50	2.8	0.07	0.	4.1	129	47.1	64.0	91.6	1.7	1.9	8.4
54090	16	1 11 77	76.9	23	2.51	3.1	0.12	0.3	27.4	152	52.0	67.5	•	•	•	•
54090	17	22 11 77	48.7	19	1.68	3.2	0.07	0.	10.1	135	23.1	47.5	92.5	1.1	1.5	9.0
55008	1	19 9 68	62.9	30	8.91	5.5	0.32	2.4	1.0	123	21.3	33.9	45.9	2.7	3.6	15.5
55008	2	2 10 68	45.7	17	[illegible]	1.8	1.40	0.	14.8	139	26.3	57.5	62.0	2.4	2.8	12.3
55008	3	22 11 68	[illegible]	[illegible]	[illegible]	1.3	[illegible]	0.	[illegible]	129	13.2	41.9	50.0	2.0	2.7	16.7
55008	6	30 3 69	42.3	9	13.34	3.4	1.14	0.	20.8	145	26.0	61.6	•	•	•	•
55008	9	10 4 69	42.0	11	13.19	2.2	0.79	0.	9.2	134	17.9	42.6	100.1	2.1	2.0	7.1
55008	11	2 6 69	34.4	13	7.91	2.8	0.54	6.7	1.9	120	14.0	40.8	62.2	1.8	2.7	12.4
55008	16	20 2 70	106.4	23	15.32	4.8	1.24	0.	20.1	145	65.7	61.7	74.3	2.7	2.6	9.8
55008	17	5 4 70	36.4	14	10.03	2.9	0.35	0.3	3.5	128	16.1	44.2	72.0	2.3	2.5	10.5
55008	18	21 4 70	28.3	10	13.53	2.7	2.05	0.5	38.0	162	14.8	52.3	89.3	1.7	2.7	7.1
55008	19	15 8 70	40.0	10	11.71	1.5	1.14	0.	9.3	134	15.8	39.6	74.5	2.1	2.8	9.4
55008	20	26 10 70	38.1	32	13.42	6.0	0.90	0.	17.9	142	51.1	58.0	[illegible]	2.1	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.	28.6	153	35.8	57.0	65.1	1.8	2.9	11.4
55012	4	5 8 73	78.9	19	295.03	9.4	14.06	23.9	10.5	111	44.6	56.5	32.3	9.0	5.5	21.4
55012	6	9 2 74	79.2	44	193.67	5.5	16.29	0.	15.5	140	47.2	59.6	23.6	7.0	3.5	23.5
55012	7	12 11 74	40.0	27	139.67	5.3	24.12	0.	13.4	138	19.7	49.3	32.3	6.0	7.0	20.4
55012	8	19 1 75	27.4	18	111.89	5.2	15.94	0.	5.2	130	13.2	48.3	36.2	6.0	6.3	17.7
55012	10	11 2 76	43.6	26	120.75	6.7	10.41	0.	6.4	131	25.9	59.4	[illegible]	[illegible]	[illegible]	[illegible]
55021	1	23 12 69	26.2	36	33.32	[illegible]	4.23	0.	[illegible]	131	14.9	57.0	7.0	30.5	30.5	[illegible]
55021	2	6 11 70	35.8	18	24.01	20.0	3.23	0.5	1.7	125	7.5	19.3	7.0	30.5	30.5	97.9
55021	3	27 1 71	24.2	29	37.21	[illegible]	16.80	0.	1.1	132	6.1	25.1	16.2	5.0	12.3	44.0
55021	4	15 1 74	19.4	13	32.01	14.0	17.04	0.	1.5	128	4.5	23.2	10.5	16.0	21.5	62.9
55021	[illegible]	13 11 74	19.8	24	23.92	15.4	8.21	45.7	6.9	86	7.5	37.9	•	•	•	•
55021	[illegible]	1 12 75	26.3	19	11.38	25.6	3.36	72.5	1.7	53	4.2	15.8	•	•	•	•
55021	[illegible]	13 10 [illegible]	20.4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	133	[illegible]	27.0	[illegible]	27.0	24.0	[illegible]
55022	1	13 1 70	19.0	15	34.64	15.7	8.76	0.	8.8	133	9.2	48.6	•	•	•	•
55022	3	20 1 71	14.3	17	32.28	13.3	9.37	0.	4.6	129	8.3	58.2	18.5	14.5	15.0	30.1
55022	5	17 3 71	31.5	31	26.50	7.4	1.94	0.	4.2	129	13.6	43.1	14.5	15.0	15.0	46.7
55022	6	12 1 72	28.6	33	26.16	4.6	4.02	0.	7.5	[illegible]	12.9	45.1	17.0	13.6	12.0	41.4
55022	7	6 12 72	39.5	29	33.99	12.6	2.63	0.3	0.6	[illegible]	[illegible]	46.3	16.5	12.0	16.0	35.6
55022	8	15 1 74	23.5	16	23.46	7.6	4.23	0.	5.4	130	[illegible]	51.5	18.0	13.0	11.5	38.8
55022	9	29 1 74	24.6	36	25.26	13.5	7.26	0.	11.1	136	[illegible]	45.7	17.5	7.0	11.0	35.5
55022	10	12 11 74	25.1	17	40.60	11.4	2.68	0.	8.8	133	15.4	34.6	20.0	14.5	11.5	32.6
55025	[illegible]	[illegible] 11 72	[illegible]	13	[illegible]	11.1	[illegible]	0.	2.3	127	8.5	[illegible]	21.5	[illegible]	[illegible]	[illegible]
55025	[illegible]	[illegible] 11 72	[illegible]	13	43.23	6.7	7.93	0.	4.7	133	6.3	32.1	42.4	5.8	5.9	14.4
55025	3	3 1 74	13.0	8	32.01	5.5	6.35	0.	8.5	133	5.2	39.9	44.7	5.6	5.7	13.5
55025	4	12 11 74	32.0	19	41.54	7.8	5.09	0.	6.1	131	10.9	34.1	•	•	•	•
55025	5	26 12 74	19.6	11	28.39	3.4	6.57	0.	6.8	131	4.8	24.4	39.9	6.0	6.0	15.9
55025	6	11 2 73	20.3	16	22.39	8.4	2.78	0.	2.2	127	5.6	27.4	32.0	5.1	6.6	21.5
55025	7	13 10 76	35.0	29	27.49	9.6	4.31	0.	2.8	127	10.9	31.0	24.7	6.0	10.4	24.2
55026	4	31 3 73	60.9	23	113.77	5.3	3.36	14.1	2.0	112	20.5	33.6	•	•	•	•
55026	5	5 8 73	74.8	17	231.93	6.0	9.07	23.1	9.7	109	41.1	55.6	•	•	•	•
55026	6	18 10 73	49.7	18	91.05	7.5	7.57	1.8	1.4	125	20.3	40.9	•	•	•	•
55026	7	30 11 75	71.1	28	113.20	4.2	12.07	8.9	6.3	122	38.1	53.6	33.3	5.1	6.9	19.6
55026	8	11 2 76	50.3	24	108.44	7.2	8.30	0.	6.5	131	31.4	62.4	29.0	6.5	8.0	22.2
55034	1	18 10 73	76.3	17	5.43	3.4	0.14	0.	3.1	128	47.4	62.2	88.4	1.4	1.6	9.4
55034	2	28 11 73	43.2	13	3.16	3.1	0.09	0.	1.9	126	21.8	50.4	76.3	2.1	2.1	10.3
55034	3	15 12 73	44.4	19	4.59	2.5	0.27	0.	15.1	140	22.2	56.7	76.8	1.4	2.8	9.0
55034	4	14 1 74	57.8	21	5.37	2.8	0.23	0.	10.5	135	36.0	62.2	84.4	1.4	1.9	8.7
55034	5	7 2 74	51.9	13	5.04	1.9	0.17	0.	5.3	130	32.9	62.6	106.8	1.4	2.6	5.3
55034	6	16 6 74	31.8	7	4.62	1.3	0.04	61.3	9.6	75	13.6	42.7	88.0	1.4	2.4	7.8
55034	7	17 10 74	41.1	18	4.55	3.6	0.09	0.	1.4	126	40.2	67.0	•	•	•	•
55034	8	21 11 74	80.3	23	3.33	3.0	0.23	0.	17.3	142	58.3	72.7	89.6	1.1	2.4	7.6
55034	9	30 12 75	85.0	26	4.74	3.0	0.11	0.2	0.9	125	57.6	67.8	67.1	1.5	2.8	10.9
55034	10	11 2 76	101.9	22	5.67	1.5	0.27	0.	6.9	131	67.8	66.5	91.3	1.4	1.7	8.7
55034	11	30 6 77	99.5	23	3.81	5.9	0.13	29.2	3.7	99	54.0	54.2	105.4	1.6	2.4	5.7
55034	12	9 9 77	50.8	18	4.29	3.6	0.27	0.	3.8	128	43.2	55.9	63.7	1.8	2.6	12.2
55034	13	25 10 77	67.0	9	3.92	2.5	0.24	1.6	9.9	133	27.9	41.6	62.2	1.6	2.8	12.3
55034	14	19 11 77	65.1	23	4.41	2.0	0.31	0.	5.4	130	39.5	60.7	61.6	1.7	3.4	11.2
56002	2	18 10 71	53.4	31	89.57	6.0	8.83	6.0	16.0	134	15.5	28.9	•	•	•	•
56002	3	12 11 72	35.3	13	42.62	5.9	5.71	19.9	4.7	109	6.4	18.1	•	•	•	•
56002	5	1 1 74	13.0	10	59.73	2.6	20.80	0.	21.5	146	2.9	22.6	•	•	•	•
56002	6	14 2 74	37.4	15	71.16	4.2	22.73	0.	8.8	133	9.9	26.4	27.5	6.0	8.6	23.2
56003	6	3 10 66	17.1	8	10.50	5.7	1.13	0.	4.7	129	3.4	20.1	45.0	3.9	5.2	14.3
56003	9	15 10 67	65.9	57	40.07	5.6	4.05	0.2	6.8	131	26.8	40.6	37.0	4.2	4.3	17.5
56003	10	22 12 67	11.2	13	18.24	3.5	4.75	0.	9.0	134	4.1	36.5	52.4	3.1	4.0	13.2
56003	15	16 6 74	24.2	7	15.47	2.6	0.67	43.2	1.9	83	3.3	13.8	52.0	3.5	4.0	13.4
56003	17	30 1 75	20.8	14	18.67	4.4	4.08	0.	6.0	130	6.1	29.4	44.5	3.5	5.0	15.0
56003	18	24 2 75	32.1	24	5.49	3.2	0.41	106.9	1.6	19	3.2	9.8	29.3	3.0	8.0	22.0
56003	19	11 2 76	23.4	23	9.51	6.8	1.66	0.	[illegible]	127	7.8	33.4	•	•	•	•
56004	1	5 1 71	49.2	63	177.72	12.7	11.57	0.	0.4	125	16.0	32.4	•	•	•	•
56004	3	2 12 72	35.8	34	252.03	19.5	40.58	0.	21.8	146	19.5	49.0	•	•	•	•
56004	4	4 12 72	25.8	13	310.92	22.4	64.83	0.	21.7	146	25.7	99.5	•	•	•	•
56004	5	10 2 74	45.1	20	324.63	6.5	90.76	0.	17.3	142	22.5	49.9	39.7	5.6	6.0	16.0
56004	7	12 11 74	58.0	20	360.25	10.8	36.53	0.	9.4	134	31.6	54.5	26.0	8.0	9.3	24.2
56004	9	24 9 75	57.8	31	118.39	6.9	6.45	106.9	1.6	19	[illegible]	[illegible]	24.0	7.8	7.2	22.9
56004	10	11 2 76	31.2	18	142.03	7.5	16.86	0.	2.9	127	11.3	36.1	28.3	9.6	8.8	21.7
56004	12	4 12 77	77.8	40	310.92	14.9	64.74	0.	21.7	146	35.9	46.1	•	•	•	•
56005	[illegible]	2 7 68	24.3	5	27.18	3.2	6.93	5.2	11.0	130	5.4	22.0	•	•	•	•
56005	[illegible]	10 7 68	35.0	14	51.95	6.6	4.60	2.0	7.1	131	16.6	30.3	31.7	7.3	6.7	21.7
56005	8	26 10 68	87.8	52	41.55	13.5	3.40	2.0	0.5	123	37.2	42.4	•	•	•	•
56005	[illegible]	23 11 68	35.1	25	24.96	5.1	3.69	0.	3.9	128	9.2	26.2	26.9	4.6	7.1	27.1
56005	10	21 12 68	34.9	23	32.32	1.6	7.85	0.	16.7	141	12.4	35.5	•	•	•	•
56005	[illegible]	1 1 71	42.5	24	[illegible]	[illegible]	3.44	0.	0.3	125	17.2	40.5	28.3	4.3	6.9	25.5

CATCH NO	EV NO	DATE OF STORM	RAINFALL TOTAL (MM)	RAINFALL DURN (H)	PEAK FLOW (CUMECS)	LAG (H)	ANSF (CUMECS)	SMD (MM)	APIS (MM)	CWI (MM)	RUNOFF (MM)	RUNOFF %	1-HOUR UNIT HYDROGRAPH UH PEAK (CUMECS PER 100 SQ KMS)	TIME TO PEAK (H)	WIDTH AT 0.5 PEAK (H)	UM TIME BASE (H)
56005	12	6 11 70	57.3	20	31.32	4.8	5.43	1.2	1.8	125	15.0	26.1	22.7	6.2	[illegible]	26.6
56005	14	24 1 75	31.7	11	34.86	5.8	6.97	0.	10.8	135	9.6	30.3	37.5	4.1	[illegible]	18.9
56005	15	14 2 74	42.5	14	36.35	4.8	9.44	0.	10.3	135	11.9	28.0	30.7	5.0	8.6	19.0
56005	16	10 10 76	30.6	11	46.86	4.1	7.58	14.3	6.3	117	12.5	40.7	*	*	*	*
56005	17	13 10 76	30.9	14	40.33	6.0	8.10	6.4	7.1	125	15.4	49.8	*	*	*	*
56005	18	17 10 76	41.7	17	49.59	6.8	9.93	2.9	5.8	127	18.9	45.4	*	*	*	*
56006	1	11 12 64	81.7	39	193.65	5.2	12.40	0.	9.1	134	52.6	64.4	*	*	*	*
56006	2	12 1 65	44.8	16	226.53	2.8	18.70	0.	13.7	138	28.6	63.9	67.6	4.5	3.8	8.8
56006	3	8 12 65	69.1	48	148.38	4.8	8.76	0.	3.2	128	35.1	50.8	*	*	*	*
56006	4	16 12 65	144.6	52	223.56	5.5	[illegible]	0.	9.2	134	106.8	73.9	*	*	*	*
56006	5	24 2 66	53.0	15	193.12	3.3	16.18	0.	8.1	133	30.5	57.5	60.0	3.5	4.0	10.5
56006	6	27 2 67	64.0	18	239.32	5.3	13.57	0.	8.2	133	42.0	65.6	38.5	6.0	5.3	18.3
56006	7	16 10 67	81.0	18	242.66	3.6	17.05	0.	14.2	139	48.0	59.3	44.0	5.8	5.6	14.1
56006	12	10 2 74	57.8	25	142.60	3.5	33.30	0.	19.7	144	27.2	47.1	50.0	3.5	4.6	13.0
56006	14	12 11 74	68.9	29	160.68	6.5	14.95	0.	16.7	141	33.9	49.2	38.0	3.7	6.0	17.3
56006	16	24 9 75	74.9	32	78.31	2.8	6.22	105.7	2.0	21	14.4	19.2	29.5	3.6	7.2	23.3
56006	17	11 2 76	41.1	21	76.95	6.7	6.53	0.	2.6	127	19.9	38.7	*	*	*	*
56006	18	2 2 77	40.3	20	89.41	3.7	14.38	0.	3.6	128	11.8	29.2	36.5	5.8	4.0	19.5
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.	14.6	139	12.9	42.2	40.0	4.6	5.8	16.2
56011	3	30 11 75	47.8	26	26.33	9.4	1.14	0.	2.4	127	19.2	40.2	22.3	4.0	8.2	33.5
56011	4	11 2 76	24.8	18	10.94	8.9	1.50	0.	3.8	128	7.7	31.0	18.3	10.5	12.5	35.8
56011	5	24 9 76	57.7	22	42.95	6.2	2.79	62.2	17.4	80	15.0	26.0	33.7	7.6	6.8	19.4
56011	7	14 3 77	40.3	31	25.09	2.8	3.14	0.	7.8	132	9.6	23.9	38.4	4.2	6.0	17.0
57004	[illegible]	[illegible]	[illegible]	37	34.88	[illegible]	4.48	0.	10.0	135	25.4	44.3	20.0	5.6	10.6	34.4
57004	2	[illegible]	[illegible]	36	27.79	8.0	3.25	0.	3.1	128	19.0	39.5	19.7	4.6	10.5	35.4
57004	3	30 12 66	[illegible]	[illegible]	41.95	5.2	5.63	0.	12.1	137	18.5	40.7	21.5	6.5	11.0	29.7
57004	4	19 2 67	[illegible]	[illegible]	34.19	10.9	7.31	0.	15.9	140	16.8	42.4	*	*	*	*
57004	5	27 2 67	79.6	20	76.87	7.2	8.19	0.	7.9	132	42.8	53.8	*	*	*	*
57004	7	4 9 67	47.9	21	30.26	8.3	1.55	0.	12.4	137	17.6	36.8	21.6	5.7	7.3	36.9
57004	8	30 9 67	44.8	23	40.29	8.1	5.81	0.	10.8	135	18.2	40.7	23.0	6.2	9.5	29.3
57004	9	15 10 67	89.0	26	93.80	9.0	10.10	0.	15.9	140	[illegible]	59.3	19.0	7.6	11.2	30.1
57004	10	22 12 67	63.9	32	38.51	9.8	4.47	0.	4.6	129	30.0	46.9	*	*	*	*
57004	13	22 3 68	100.6	45	49.69	7.9	4.07	0.	5.6	130	53.9	53.6	*	*	*	*
57004	14	1 7 68	37.0	15	31.43	3.6	5.61	0.	7.2	132	10.0	27.1	*	*	*	*
57004	15	9 7 68	37.4	22	29.32	5.0	2.69	8.1	1.8	118	9.5	25.4	30.0	3.2	7.3	22.5
57004	16	10 10 68	39.5	21	31.25	9.3	4.63	0.	10.0	135	12.7	32.1	23.0	7.4	9.0	30.3
57004	17	26 10 68	79.0	46	33.52	11.8	3.30	1.6	0.	123	34.3	43.4	18.2	7.3	8.2	44.7
57004	18	21 12 68	37.6	23	30.37	6.7	6.43	0.	15.0	139	15.8	42.0	19.3	5.6	8.8	40.0
57004	19	25 4 69	37.9	31	25.11	7.5	2.18	0.	7.3	132	11.9	31.4	22.5	5.2	8.0	33.4
57004	20	11 8 69	64.9	20	32.07	9.1	2.37	5.8	2.7	121	19.5	30.1	18.3	5.1	13.5	33.8
57005	1	22 3 69	97.9	44	218.87	7.6	29.05	0.	7.3	132	49.6	50.7	*	*	*	*
57005	[illegible]	[illegible]	[illegible]	[illegible]	142.39	[illegible]	24.60	1.4	13.9	137	15.5	39.6	20.5	8.2	10.3	33.6
57005	5	10 10 68	49.1	37	159.05	9.7	22.63	0.	10.4	135	22.4	45.7	22.2	[illegible]	8.2	33.7
57005	6	26 10 68	83.8	47	199.89	9.7	19.40	1.6	0.2	123	41.7	49.8	20.2	5.6	15.5	24.0
57005	7	17 1 69	42.7	39	155.60	6.5	32.66	0.	9.7	134	22.2	51.9	*	*	*	*
57005	8	10 11 69	40.7	12	154.03	5.5	23.40	0.	11.6	136	12.0	29.6	27.2	4.5	8.5	23.9
57005	9	14 1 70	53.2	34	217.51	10.5	38.92	0.	20.1	165	25.7	48.3	*	*	*	*
57005	10	1 11 70	51.1	17	224.03	6.2	40.53	0.	43.3	168	23.9	46.8	23.3	4.7	9.6	28.5
57005	12	15 10 71	64.7	31	236.23	10.5	16.61	0.	13.6	138	33.8	52.3	19.5	7.6	10.0	37.0
57005	13	4 12 72	62.3	23	281.29	10.2	69.39	0.	19.9	144	31.4	50.4	22.0	7.8	8.7	33.1
57006	1	10 10 68	43.7	12	65.38	4.4	10.67	0.	11.6	136	17.6	40.3	45.0	1.8	4.8	15.1
57006	2	22 4 70	40.2	18	61.30	4.0	12.57	0.6	16.0	140	15.5	38.4	42.5	1.7	3.4	19.4
57006	3	1 11 70	63.8	15	93.76	3.7	18.50	0.	28.4	153	35.1	55.1	43.5	2.7	3.8	18.0
57006	4	6 1 71	71.5	23	89.19	5.1	4.01	0.	2.7	127	23.4	32.7	69.0	2.1	2.5	11.1
57006	5	17 10 71	97.0	39	82.37	6.5	5.64	0.	10.2	135	47.4	48.8	33.5	3.9	4.7	23.8
57006	6	14 2 72	95.6	31	73.51	5.4	8.21	0.	2.3	127	42.4	44.4	38.0	3.0	4.5	20.3
57006	7	7 9 72	68.2	22	61.93	6.0	1.63	33.7	3.7	95	11.2	16.4	70.0	2.0	2.6	10.7
57006	8	12 11 72	64.8	18	97.35	2.8	9.62	0.	8.3	133	27.0	41.7	47.5	2.0	4.0	15.4
57006	9	30 11 72	68.3	30	74.46	5.3	9.32	0.	17.8	142	40.0	58.6	32.5	2.0	5.0	24.2
57006	10	3 12 72	48.4	19	62.46	3.8	14.44	0.	24.5	149	19.2	39.6	33.5	2.0	5.1	23.0
57006	11	4 12 72	75.0	21	91.75	4.0	22.58	0.	32.4	157	37.4	49.9	38.5	2.0	5.3	18.3
57006	12	12 12 72	57.1	12	94.37	3.9	19.11	0.	22.7	147	26.2	45.9	45.0	2.4	4.5	15.7
57006	13	1 4 73	66.7	19	60.08	6.1	2.91	0.6	1.2	125	19.0	28.5	48.0	3.4	4.2	14.8
57006	14	4 8 73	83.1	26	79.11	4.3	6.28	0.	16.8	141	24.5	29.5	47.0	2.5	4.5	14.7
57006	15	9 1 74	40.9	9	76.32	3.4	10.98	0.	12.4	137	15.3	37.4	45.0	2.9	4.6	15.5
57006	16	10 11 74	42.4	17	64.47	2.8	10.28	0.	15.9	140	14.2	33.4	70.0	2.0	2.3	11.3
57006	17	12 11 74	61.7	24	87.94	2.0	15.26	0.	22.3	147	27.6	44.7	*	*	*	*
57006	18	19 1 75	57.2	21	98.89	4.6	9.43	0.	6.7	131	26.3	46.0	64.0	3.0	2.8	11.8
57006	19	21 1 75	75.2	20	108.52	6.5	14.21	0.	25.0	150	45.5	60.6	50.0	3.0	3.7	14.8
57006	20	24 1 75	51.6	13	91.33	3.9	[illegible]	0.	25.6	150	22.7	44.0	58.0	2.0	2.9	13.4
57006	22	30 11 75	91.4	21	113.07	3.5	[illegible]	0.	4.7	129	47.1	51.5	45.0	2.0	3.5	17.7
57006	23	4 10 76	64.3	26	69.27	7.4	[illegible]	0.	16.1	141	36.8	57.2	27.5	4.6	5.9	28.6
57006	24	15 3 77	42.0	13	62.04	3.7	[illegible]	0.4	15.1	139	16.8	40.0	*	*	*	*
57006	25	30 10 77	55.9	24	64.26	4.9	5.46	0.1	3.2	128	23.1	39.2	42.5	2.1	4.4	17.4
57006	26	31 10 77	94.0	23	146.06	7.6	12.48	0.	26.1	151	64.6	68.7	45.5	2.7	3.7	17.0
58001	1	26 1 61	31.6	14	59.43	3.8	8.44	0.5	0.1	124	6.7	21.3	*	*	*	*
58001	2	10 9 62	66.7	29	114.48	5.3	6.33	0.	2.8	127	18.6	27.8	*	*	*	*
58001	3	16 11 63	55.4	16	107.34	4.9	16.31	0.	15.4	140	11.4	20.6	40.8	6.5	4.9	17.5
58001	4	15 11 63	48.5	29	127.72	5.3	39.52	0.	53.3	178	13.1	27.0	41.0	4.0	4.6	17.5
58001	5	13 7 64	56.8	27	48.84	3.8	8.28	5.5	15.3	134	12.4	21.8	*	*	*	*
38001	9	15 1 65	50.6	25	63.51	5.4	17.80	0.	17.0	142	19.5	38.5	20.4	4.0	11.0	32.5
58001	11	11 7 65	74.1	48	45.54	5.7	6.68	31.8	19.5	112	24.1	32.6	23.0	4.0	7.0	34.3
58001	12	7 12 65	82.5	36	99.57	6.4	15.27	0.	3.6	128	33.8	40.9	35.0	4.2	5.1	21.6
58001	15	30 12 66	46.0	17	119.87	4.1	23.17	0.	21.5	146	20.7	45.1	34.0	4.3	7.0	18.7
58001	17	28 7 67	78.6	29	112.62	8.6	8.73	19.5	19.7	125	35.7	45.5	26.3	4.2	4.4	33.5
58001	18	15 10 67	61.8	20	115.92	6.1	17.61	0.	16.5	141	32.7	53.0	33.8	5.4	4.7	23.5
58001	19	26 6 68	40.9	19	110.87	5.1	14.51	1.7	25.2	148	[illegible]	32.1	43.0	3.3	3.8	18.3
58001	20	27 10 68	49.8	29	69.68	5.1	14.73	0.	15.8	140	24.2	38.7	*	*	*	*
58001	21	1 11 70	64.7	15	143.82	5.6	27.62	0.	30.8	155	30.6	61.3	*	*	*	*
58002	10	1 11 70	52.8	17	154.68	4.6	2.51	0.	20.3	145	26.1	49.3	36.9	7.4	8.4	13.3
58002	11	6 1 71	69.7	24	141.22	7.6	0.52	0.	1.1	126	18.0	25.8	45.3	4.6	4.6	15.3
58002	12	9 8 71	67.2	18	128.04	6.9	4.94	4.6	2.0	122	24.6	36.6	38.0	5.0	7.2	14.9
58002	13	18 10 71	71.7	33	141.13	4.7	11.78	0.	14.5	139	28.2	39.4	36.0	3.4	6.0	18.9
58002	14	11 11 72	50.3	26	130.97	3.1	9.77	0.	8.3	133	16.3	32.4	35.5	4.8	6.4	18.5
58002	15	5 8 73	75.1	24	156.82	5.4	7.29	19.6	22.1	127	28.1	36.0	46.0	4.0	4.5	15.2

CATCH NO	EV NO	DATE OF STORM	RAINFALL TOTAL (MM)	RAINFALL DURN (H)	PEAK FLOW (CUMECS)	LAG (H)	ANSF (CUMECS)	SMD (MM)	APIS (MM)	CWI (MM)	RUNOFF (MM)	RUNOFF %	1-HOUR UNIT HYDROGRAPH UH PEAK (CUMECS PER 100 SQ KMS)	TIME TO PEAK (H)	WIDTH AT 0.5 PEAK (H)	UM TIME BASE (H)
58003	1	15 1 65	40.5	26	18.16	10.0	3.10	0.	10.9	135	18.2	44.9	25.2	7.7	9.6	24.9
58003	2	1 12 65	17.4	10	18.09	6.2	3.59	0.	7.2	132	7.1	40.7	34.7	6.7	7.0	18.0
58003	3	8 12 65	49.3	32	20.12	7.2	3.26	0.	2.5	127	20.6	41.7	24.3	9.0	10.0	25.8
58003	4	16 12 65	92.3	51	20.97	9.4	4.31	0.	9.0	134	47.8	51.8	*	*	*	*
58003	5	2 3 66	27.9	13	17.88	6.8	2.58	0.	8.8	133	9.4	33.8	33.0	5.3	7.7	18.3
58003	6	21 4 66	35.6	25	17.77	5.7	2.64	1.0	3.4	127	12.5	35.1	36.2	3.8	5.5	19.7
58003	7	19 2 67	38.3	45	19.19	11.0	1.69	0.	9.8	134	11.5	30.1	*	*	*	*
58003	9	18 12 67	35.2	17	16.30	5.6	1.37	0.	2.0	126	11.6	33.1	29.8	8.3	7.0	23.3
58003	10	22 12 67	35.2	20	18.50	5.7	1.91	0.	8.2	133	12.1	34.5	27.0	8.4	8.4	24.4
58003	11	8 1 68	36.4	23	18.55	5.9	1.85	0.	5.5	130	11.3	30.9	[illegible]	5.8	7.7	[illegible]
58003	12	9 7 68	38.4	25	19.45	5.5	1.57	5.1	2.8	119	10.2	26.5	32.5	6.3	6.9	20.4
58006	1	9 8 71	70.7	23	67.32	9.7	3.17	71.2	3.1	56	40.4	57.1	36.4	5.2	6.0	18.5
58006	2	18 10 71	74.4	33	65.43	6.2	4.90	6.0	15.2	134	46.2	62.1	33.5	5.0	6.7	19.5
58006	3	9 11 72	46.7	19	42.53	7.5	2.78	21.0	5.5	109	12.9	27.6	*	*	*	*
58006	4	11 11 72	51.1	21	59.25	[illegible]	3.94	15.6	9.8	119	23.4	45.7	37.5	2.9	4.9	19.9
58006	5	31 3 73	54.7	27	45.34	[illegible]	1.76	11.0	3.4	117	18.2	33.3	42.7	3.2	4.6	16.8
58006	6	5 8 73	38.4	23	66.76	4.0	3.48	41.3	22.1	105	34.1	38.5	53.2	2.8	3.9	13.1
58008	1	18 12 71	20.8	10	20.80	4.4	0.92	0.	0.8	125	8.9	42.7	30.0	4.1	5.0	12.2
58008	2	14 2 72	55.8	30	26.00	7.4	1.73	0.0	1.7	126	30.8	55.3	30.0	4.0	6.5	24.1
58008	3	6 6 72	34.0	21	24.97	7.8	2.27	5.3	7.6	127	11.6	34.2	42.0	5.1	5.0	16.5
58008	4	9 11 72	20.4	17	29.08	3.8	2.19	41.7	4.2	87	14.5	70.9	51.0	3.1	4.7	12.6
58008	5	11 11 72	47.9	27	47.04	2.2	2.56	17.1	2.5	110	23.1	48.3	45.0	4.1	5.5	13.7
58008	6	30 11 72	31.6	39	32.25	11.1	2.13	0.	14.8	139	37.1	72.0	43.0	4.2	6.0	17.0
58008	7	12 12 72	[illegible]	24	33.45	3.5	4.07	0.	10.5	143	22.5	67.4	[illegible]	5.5	5.0	15.9
58009	1	11 11 72	25.2	25	17.04	5.3	1.83	16.9	3.1	111	9.9	26.0	30.0	4.5	6.7	23.7
58009	2	12 12 72	15.7	12	15.25	5.1	4.72	0.	12.9	137	4.4	28.0	39.8	5.0	6.0	15.9
58009	3	22 1 73	14.6	16	8.99	4.9	1.53	0.	3.8	128	4.0	27.5	*	*	*	*
58009	4	11 2 73	24.2	19	12.49	6.7	2.07	0.	2.9	127	7.3	30.2	33.3	5.4	6.1	21.2
58009	5	1 4 73	31.2	16	10.20	9.6	0.89	11.1	1.3	115	5.8	18.7	27.0	6.4	8.8	23.6
58009	6	27 9 73	41.2	19	9.41	4.8	0.73	42.9	3.2	85	6.4	15.5	27.0	5.3	8.0	25.2
60002	2	8 12 65	47.1	39	125.89	13.1	33.04	0.	13.0	137	24.1	51.2	*	*	*	*
60002	3	26 2 67	36.6	20	163.03	5.6	18.71	0.	4.9	129	22.6	40.0	25.1	6.0	9.4	25.5
60002	5	1 10 67	35.1	14	166.04	9.1	27.42	1.6	15.9	139	28.6	51.9	19.6	9.0	11.4	33.9
60002	6	15 10 67	36.5	18	151.68	5.8	36.73	0.	15.1	140	25.8	45.7	21.5	4.4	10.4	30.9
60002	7	15 1 68	39.7	21	111.70	7.3	24.50	0.	7.1	132	18.1	45.7	22.5	8.3	9.9	29.6
60002	9	12 12 72	32.1	11	130.46	8.8	38.96	0.	14.9	139	17.2	53.5	*	*	*	*
60002	10	5 8 73	86.5	17	183.46	9.7	14.49	2.7	14.9	137	39.4	45.6	*	*	*	*
60002	13	2 2 74	66.0	35	141.60	10.5	30.09	0.	13.1	138	42.9	65.0	*	*	*	*
60002	14	30 1 75	31.6	19	132.02	7.7	23.91	0.	9.5	134	20.7	65.6	*	*	*	*
60003	7	21 4 66	41.9	25	[illegible]	[illegible]	12.80	[illegible]	7.2	131	16.6	44.5	17.0	14.6	13.7	38.0
60006	5	7 8 72	34.0	13	61.65	3.1	4.71	3.5	9.1	130	9.9	29.2	*	*	*	*
60007	2	2 7 68	28.0	15	151.64	3.2	35.47	0.9	19.8	143	14.0	49.8	41.0	2.6	4.0	19.1
60007	3	10 11 69	62.9	33	235.14	1.7	18.01	0.	16.1	141	39.5	62.7	37.3	3.5	5.1	19.6
61001	1	10 9 62	42.6	38	19.64	9.4	1.68	0.	5.1	130	5.4	12.6	20.6	9.8	11.0	32.0
61001	2	29 9 62	40.6	29	26.47	6.3	1.62	0.0	6.5	131	6.3	15.5	*	*	*	*
61001	4	16 11 63	34.0	26	41.98	10.0	8.54	0.	7.0	131	11.4	33.6	19.5	9.0	13.0	31.0
61001	6	12 1 65	21.4	20	34.63	4.6	7.29	0.	7.3	132	5.0	23.6	32.0	4.3	6.4	22.0
61001	10	28 11 65	30.7	32	43.17	4.9	9.81	0.	4.6	129	8.3	27.0	26.0	6.0	7.7	27.4
61001	11	16 12 65	34.3	31	52.48	9.4	15.90	0.	10.4	135	13.1	38.1	18.0	8.4	10.5	40.8
61001	13	21 4 66	35.7	25	45.11	9.0	11.88	1.8	9.2	132	11.6	32.4	23.2	8.0	[illegible]	26.1
61001	15	12 8 66	36.5	35	41.20	6.9	4.78	0.	6.9	131	8.0	22.0	25.5	8.5	8.5	26.0
61001	16	26 2 67	38.7	43	53.00	5.9	13.93	0.	7.8	132	12.1	31.2	23.5	6.8	8.7	29.9
61001	18	28 9 67	37.3	35	43.88	8.0	8.37	0.	4.1	129	8.5	22.8	26.1	6.2	8.0	26.6
61001	19	1 10 67	37.3	33	53.10	8.1	11.38	1.2	10.8	134	10.3	27.6	28.1	6.3	7.7	24.2
61001	21	26 6 68	24.8	22	25.31	6.6	3.22	25.6	6.8	106	3.8	15.3	29.4	5.8	6.9	24.0
61001	22	16 12 68	33.1	29	34.03	3.9	8.10	0.	3.5	130	7.5	22.8	24.2	3.5	9.5	27.0
61001	23	20 12 68	25.8	22	36.15	6.2	10.77	0.	8.9	133	5.0	19.4	26.2	6.3	8.6	25.2
61001	24	21 12 68	15.4	25	40.14	4.7	13.56	0.	20.9	145	4.4	28.4	33.0	5.5	6.5	20.7
61001	25	24 12 68	26.3	28	44.75	8.2	12.44	0.	7.1	132	9.2	35.0	22.4	6.7	9.7	30.2
61001	26	17 11 70	22.3	13	50.97	5.3	13.64	0.	11.9	136	7.7	34.4	29.5	7.8	8.4	20.9
61001	27	18 11 70	24.0	11	53.35	6.0	19.03	0.	20.0	145	7.4	31.5	30.3	8.7	8.7	19.3
61001	28	20 11 71	34.4	11	54.45	8.6	4.59	0.	11.1	136	11.9	34.7	24.0	8.0	9.9	26.5
61001	29	29 11 71	41.7	22	59.33	7.9	11.39	0.1	2.8	127	14.5	34.8	*	*	*	*
61003	1	16 6 69	56.1	32	9.99	7.8	0.44	42.5	4.0	86	14.9	26.5	35.0	6.5	7.3	17.3
61003	2	13 12 69	44.5	21	17.97	6.8	1.17	0.0	3.6	128	16.0	36.1	37.5	4.0	7.1	15.6
61003	3	20 11 71	45.0	20	28.11	7.2	1.23	0.	10.5	135	23.0	51.0	37.3	6.8	6.6	16.6
61003	5	14 2 72	40.6	23	14.86	6.9	1.72	0.2	2.5	127	19.2	47.3	29.5	6.1	7.0	23.7
61003	7	12 11 72	35.8	15	13.06	5.3	1.18	0.	6.7	131	10.2	28.5	35.8	4.8	6.3	16.6
61003	9	30 1 75	23.4	16	16.75	4.2	2.52	0.	10.4	135	12.6	53.6	41.5	4.0	6.0	14.8
61003	10	9 1 74	25.6	7	21.67	5.0	2.99	0.	16.4	141	13.3	49.9	47.5	5.0	5.5	12.4
61003	11	12 11 74	47.7	23	17.45	5.8	1.48	0.	6.6	131	18.3	42.8	39.5	6.4	5.7	16.8
62002	4	6 6 72	53.9	83	85.29	25.0	13.86	0.	9.2	134	31.5	58.4	*	*	*	*
62002	5	11 12 72	37.6	36	97.99	[illegible]	32.74	0.	5.6	130	25.0	66.4	*	*	*	*
62002	7	4 1 74	83.4	73	172.46	5.7	35.77	0.	5.0	130	45.7	54.8	*	*	*	*
64001	17	14 9 66	24.0	13	203.55	4.9	23.44	1.2	10.3	134	11.6	48.4	39.2	5.4	6.4	15.6
64001	18	29 11 66	31.9	21	204.98	5.9	34.36	0.	12.2	137	17.2	53.8	*	*	*	*
64001	19	30 11 66	71.5	49	213.95	6.4	53.78	0.	20.5	145	34.0	47.5	*	*	*	*
64001	20	8 12 66	[illegible]	48	269.13	5.5	38.30	0.	8.7	133	46.8	58.9	23.6	4.9	9.0	29.1
64001	21	27 2 67	60.0	20	310.90	5.8	39.22	0.	7.1	132	37.7	62.9	21.4	4.0	12.9	26.2
64001	24	21 12 67	[illegible]	63	270.15	7.0	35.39	0.	5.6	130	56.4	56.8	18.2	5.2	11.5	38.1
65001	1	[illegible]	[illegible]	26	50.76	6.9	0.95	0.	4.8	129	48.6	43.5	26.3	5.6	7.4	27.5
65001	2	[illegible]	[illegible]	[illegible]	51.32	5.3	2.46	5.2	16.8	136	29.2	38.9	28.0	4.8	5.3	23.1
65001	3	[illegible]	[illegible]	[illegible]	44.45	4.4	1.81	0.8	13.2	137	19.3	30.2	32.7	4.7	7.5	19.0
65001	4	[illegible]	[illegible]	[illegible]	39.10	5.5	1.70	0.	8.9	133	29.5	39.6	24.5	6.0	8.0	29.4
65001	5	[illegible]	[illegible]	[illegible]	48.65	5.2	3.65	3.6	22.3	143	21.4	39.9	32.2	3.9	7.0	20.5
65001	6	[illegible]	[illegible]	36	46.38	5.2	1.86	3.2	10.8	132	36.2	36.8	28.7	3.4	6.4	25.9
65001	8	[illegible]	[illegible]	35	49.76	5.8	1.82	0.	7.6	132	24.0	33.0	32.2	3.7	7.9	18.7
65001	10	8 12 64	105.9	47	61.50	5.3	4.06	0.	30.6	155	48.3	46.5	30.0	2.8	6.8	23.5
65001	11	11 12 64	[illegible]	54	62.39	5.0	3.28	0.1	15.7	140	95.3	46.4	26.4	2.4	8.8	24.5
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	7.0	2.07	0.	17.5	142	98.2	54.4	23.4	6.2	8.6	30.3

CATCH NO	EV NO	DATE OF STORM	RAINFALL TOTAL (MM)	RAINFALL DURN (H)	PEAK FLOW (CUMECS)	LAG (H)	ANSF (CUMECS)	SMD (MM)	APIS (MM)	CWI (MM)	RUNOFF (MM)	RUNOFF %	1-HOUR UNIT HYDROGRAPH: UH PEAK (CUMECS PER 100 SQ KMS)	TIME TO PEAK (H)	WIDTH AT 0.5 PEAK (H)	UH TIME BASE (H)
65001	13	14 9 65	123.3	28	52.78	9.1	0.35	3.2	4.5	126	52.9	42.9	25.5	3.4	9.8	24.0
65001	14	28 12 65	71.6	17	43.81	5.0	1.32	0.	0.7	125	25.3	35.3	31.3	3.7	7.0	21.5
65001	15	26 6 66	106.8	24	51.09	8.2	0.80	2.4	7.7	130	45.2	42.3	22.0	3.9	10.[illegible]	30.5
65001	21	22 3 68	117.2	34	56.63	11.0	1.52	0.	17.5	137	65.7	56.0	*	*	*	*
65801	2	28 4 72	86.3	17	17.60	4.0	0.46	20.0	1.0	105	38.9	45.1	45.0	2.1	5.1	14.5
65801	8	11 11 72	65.0	25	23.50	5.9	0.86	0.	11.9	136	53.5	82.8	49.2	6.7	5.1	12.4
65801	16	12 12 72	55.8	10	28.00	3.1	1.99	0.	36.5	161	44.3	79.3	69.0	2.4	3.0	10.1
66002	2	24 5 68	40.5	32	36.44	10.7	3.36	14.0	0.1	111	7.9	19.6	*	*	*	*
66002	3	30 6 68	66.3	31	58.31	9.1	3.44	40.0	2.8	87	12.0	18.0	29.0	4.8	5.6	27.1
66002	5	5 5 69	29.9	21	35.71	5.2	4.82	0.	3.6	125	4.6	15.4	35.1	7.4	5.6	20.5
66002	10	5 7 73	76.8	25	42.74	13.3	0.05	102.7	21.0	43	8.0	10.5	28.6	1.8	9.2	20.5
66004	1	29 8 70	37.7	31	2.54	9.2	0.57	102.7	4.3	26	2.7	4.6	*	*	*	*
66004	2	11 6 71	21.5	10	1.39	5.5	0.54	54.4	8.0	78	0.6	2.7	*	*	*	*
66004	3	25 7 71	[illegible]	9	7.66	3.1	0.57	[illegible]	13.0	71	[illegible]	[illegible]	*	*	*	*
[illegible]	[illegible]	[illegible] 8 73	[illegible]	[illegible]	3.63	11.0	0.66	77.6	0.1	57	2.6	4.6	*	*	*	*
66004	7	14 7 73	61.2	34	2.37	19.9	0.52	83.3	7.7	49	1.7	2.8	*	*	*	*
66006	1	15 7 73	74.4	29	63.92	13.8	3.19	101.9	18.6	41	17.5	23.6	24.3	6.5	6.7	32.4
66006	3	19 11 74	23.4	16	50.57	6.2	6.21	0.3	2.6	127	7.8	33.1	35.1	4.4	7.1	17.5
66006	7	2 1 76	30.4	12	81.79	6.2	16.47	8.3	17.9	134	12.8	42.2	*	*	*	*
66006	9	13 10 75	84.6	48	141.17	12.3	8.90	8.7	5.4	121	57.6	68.3	24.2	9.3	8.1	29.8
66011	1	7 7 64	71.6	15	236.74	5.4	6.51	44.4	0.1	80	19.3	27.0	*	*	*	*
66011	2	12 11 64	41.2	13	241.45	5.5	10.39	0.	8.1	133	21.4	51.9	36.9	4.3	6.4	17.3
66011	4	11 12 64	191.5	34	535.23	5.9	26.01	0.	22.3	147	147.5	77.0	*	*	*	*
66011	6	[illegible] 65	42.6	10	333.01	4.2	20.64	2.0	9.8	132	22.5	52.7	*	*	*	*
66011	9	[illegible] 66	40.6	17	301.86	5.5	15.83	0.	13.1	138	23.2	57.2	*	*	*	*
66011	10	30 [illegible] 66	75.4	43	335.68	[illegible]	27.90	0.	11.0	135	45.0	58.9	45.0	3.5	5.6	11.5
66011	11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.	7.6	129	[illegible]	[illegible]	*	*	*	*
66011	12	26 [illegible] 67	71.8	19	520.77	6.8	35.88	0.	7.6	132	38.9	63.0	49.6	5.2	4.8	12.8
66011	13	1 10 67	56.8	15	442.82	5.7	25.15	0.3	9.8	134	42.1	74.1	44.0	2.7	5.5	14.3
66011	14	16 10 67	71.4	23	396.79	3.8	43.22	0.2	16.3	141	55.3	77.4	35.7	5.0	7.0	17.1
66011	15	22 12 67	57.9	18	376.91	6.6	19.00	0.	2.8	127	44.9	77.6	35.0	4.6	7.4	17.0
67003	1	22 3 68	50.2	35	13.39	2.8	1.60	0.	10.3	135	38.0	75.7	*	*	*	*
67003	3	19 8 70	47.1	30	13.31	3.8	0.34	101.1	2.2	25	31.2	66.2	40.0	6.8	7.0	13.8
67003	4	28 2 71	17.7	19	7.42	7.7	0.52	1.4	2.2	125	11.8	66.5	42.0	4.8	5.0	16.3
67003	5	9 8 71	45.8	24	14.81	10.2	0.27	74.0	1.0	52	24.5	53.5	44.0	4.8	4.6	16.1
67003	6	30 7 72	46.2	27	21.80	7.4	0.17	62.5	0.5	43	35.1	76.1	[illegible]	[illegible]	[illegible]	[illegible]
67003	7	[illegible] 7 73	25.[illegible]	6	14.17	3.7	[illegible]	[illegible]	[illegible]	[illegible]	11.[illegible]	41.0	48.0	5.0	5.5	12.2
67005	7	22 2 67	40.7	21	36.14	6.2	7.73	0.	7.1	132	12.3	30.1	22.5	5.8	8.6	32.2
67005	8	27 2 67	48.2	28	30.85	6.8	7.97	0.	5.4	130	14.5	30.1	20.3	5.0	8.5	37.8
67005	9	15 10 67	53.6	50	27.28	3.7	5.89	0.	9.6	134	15.0	27.9	*	*	*	*
67005	10	28 10 67	26.4	13	24.47	3.4	9.20	0.8	13.9	138	6.7	25.5	25.3	5.4	9.2	25.6
67008	13	24 5 68	38.6	30	16.69	5.2	2.06	14.0	0.3	111	6.0	15.5	*	*	*	*
67008	15	1 11 68	24.7	20	12.17	12.6	2.20	0.	3.1	128	4.9	19.8	11.5	9.6	24.0	48.7
67008	17	25 4 69	19.4	11	12.13	7.8	2.54	5.7	14.1	120	2.4	12.2	22.0	7.4	9.0	32.5
67008	18	29 5 69	23.3	19	21.23	5.2	6.00	5.6	3.5	122	3.9	16.8	20.0	6.1	13.5	28.6
67008	20	5 4 70	18.7	14	17.59	7.9	4.98	1.4	1.7	125	3.3	17.4	21.2	6.0	9.0	34.5
67008	22	13 8 71	59.0	31	17.44	13.9	1.14	29.3	0.6	96	6.4	10.8	*	*	*	*
67008	23	20 11 71	28.5	21	29.84	12.0	2.92	0.1	5.3	130	9.5	33.5	13.0	6.0	19.0	47.5
67010	1	26 6 66	58.4	18	11.46	4.6	0.34	3.6	5.3	126	37.2	63.7	39.7	3.3	6.0	16.1
67010	2	13 9 66	50.7	15	12.61	2.7	0.86	0.	11.6	136	23.5	46.3	51.8	2.8	4.9	11.6
67010	3	29 11 66	52.2	25	11.87	2.3	0.51	0.	6.4	131	24.5	46.9	54.7	2.4	4.8	10.8
67010	4	22 2 67	72.9	21	11.16	5.1	0.32	0.	6.7	131	33.6	46.1	40.2	3.8	5.5	16.2
67010	5	26 2 67	77.0	19	18.02	2.7	0.70	0.	10.0	134	35.6	45.7	57.7	1.7	2.5	14.3
67010	6	9 6 67	67.3	21	11.74	3.2	0.57	0.	15.8	140	40.4	60.0	44.8	3.8	4.3	16.3
67010	7	1 10 67	54.7	13	13.60	2.8	0.73	0.	16.2	141	25.6	46.8	47.1	2.7	4.3	15.0
67010	8	15 10 67	78.6	22	12.30	6.7	0.95	0.	23.7	148	49.2	62.6	*	*	*	*
67010	9	22 12 67	75.0	14	14.52	4.5	0.77	0.	6.8	131	44.6	59.5	*	*	*	*
67010	11	18 3 68	103.0	29	15.01	7.6	0.36	0.	6.4	131	60.4	58.7	47.1	2.7	4.1	15.4
67010	13	19 9 68	94.5	31	10.53	7.3	(0.23)	4.1	0.1	121	42.9	45.4	*	*	*	*
67010	14	2 10 68	31.5	10	11.29	2.4	1.17	0.	25.1	150	20.3	64.5	50.5	2.6	4.1	13.8
68006	2	8 9 65	30.3	12	92.81	5.0	4.69	2.6	5.4	127	13.0	42.8	48.0	3.5	5.2	12.8
68006	3	9 9 65	41.9	19	122.99	4.3	6.81	0.	11.4	136	24.0	40.0	43.1	6.0	4.9	16.0
68006	4	8 12 65	35.1	23	104.96	8.2	4.06	0.	7.5	132	24.3	69.4	*	*	*	*
68006	5	14 9 66	25.1	7	70.82	7.2	3.19	0.	6.8	131	10.0	39.8	44.8	6.2	5.6	13.6
68006	6	2 10 67	20.6	10	54.53	4.5	4.35	0.	7.3	132	6.6	32.0	46.5	4.8	5.0	13.9
68006	7	1 7 68	29.2	11	84.43	5.7	1.32	3.4	4.1	125	10.9	37.2	*	*	*	*
68010	5	20 11 74	31.4	22	5.65	5.7	0.68	0.	0.6	125	16.1	51.2	24.0	4.0	9.8	[illegible]
68802	1	11 12 64	87.9	33	1.39	5.5	0.09	4.2	1.3	122	[illegible]	24.9	*	*	*	*
68802	2	8 12 65	31.9	23	1.41	4.3	0.12	0.	2.6	128	[illegible]	51.3	22.6	2.4	[illegible]	[illegible]
68802	4	14 5 67	19.3	13	1.25	4.1	0.17	3.2	8.0	129	[illegible]	47.7	32.3	[illegible]	[illegible]	[illegible]
68802	5	18 5 67	17.2	15	1.05	3.8	0.05	6.0	2.7	121	[illegible]	46.4	31.4	2.2	[illegible]	[illegible]
68802	6	1 7 68	31.6	11	1.73	5.0	0.20	0.1	12.8	137	16.3	51.5	26.4	[illegible]	[illegible]	[illegible]
68802	8	1 11 68	20.3	13	1.75	5.4	0.11	7.1	[illegible]	[illegible]	[illegible]	[illegible]	*	*	*	*
68802	9	5 5 69	32.2	13	1.50	3.3	0.11	9.7	2.5	117	[illegible]	41.1	31.5	[illegible]	[illegible]	[illegible]
68802	10	30 5 69	15.0	3	1.37	1.6	0.21	2.8	8.3	130	4.2	28.3	30.2	[illegible]	[illegible]	[illegible]
69008	1	11 5 67	16.9	5	4.41	2.7	0.46	[illegible]	[illegible]	126	1.5	8.7	*	*	*	*
69008	3	24 6 67	42.8	30	7.21	9.8	0.16	60.1	1.6	86	6.0	14.1	*	*	*	*
69008	4	13 7 67	32.4	15	5.71	5.4	0.22	41.6	0.	93	2.2	9.0	*	*	*	*
69008	5	16 10 67	[illegible]	[illegible]	7.25	9.0	0.96	[illegible]	7.1	131	13.9	44.4	17.[illegible]	[illegible]	[illegible]	[illegible]
69008	8	18 10 67	[illegible]	[illegible]	28.23	12.0	4.50	66.6	13.9	72	31.4	68.0	19.[illegible]	[illegible]	[illegible]	[illegible]
69011	2	30 9 68	[illegible]	23	21.19	5.1	2.89	0.	7.5	132	11.9	29.2	29.0	[illegible]	[illegible]	[illegible]
69011	4	14 4 69	[illegible]	22	16.58	5.1	0.58	2.0	2.3	125	9.4	35.0	[illegible]	[illegible]	[illegible]	[illegible]
69012	1	1 7 68	24.0	11	41.33	5.6	10.58	0.	6.6	131	13.4	56.0	36.2	[illegible]	[illegible]	[illegible]
69012	2	1 10 68	23.6	13	27.60	3.9	11.69	0.	6.9	131	9.5	41.2	25.5	[illegible]	[illegible]	[illegible]
69012	4	1 11 68	16.9	15	[illegible]	[illegible]	[illegible]	0.	7.8	132	10.9	64.3	34.5	5.0	5.9	20.4
69013	1	26 9 71	13.0	10	4.81	3.2	0.26	41.1	0.7	84	1.5	11.5	50.0	4.0	4.5	13.2
69013	3	7 6 74	14.4	6	2.51	2.3	0.30	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

CATCH NO	EV NO	DATE OF STORM	RAINFALL TOTAL (MM)	RAINFALL DURN (H)	PEAK FLOW (CUMECS)	LAG (H)	ANSF (CUMECS)	SMD (MM)	APIS (MM)	CWI (MM)	RUNOFF (MM)	RUNOFF %	1-HOUR UNIT HYDROGRAPH: UH PEAK (CUMECS PER 100 SQ KMS)	TIME TO PEAK (H)	WIDTH AT 0.5 PEAK (H)	UH TIME BASE (H)
69013	5	21 7 73	31.2	19	13.07	2.0	1.53	27.9	12.6	109	8.0	25.6	*	*	*	*
69013	6	5 8 75	7.3	3	1.74	2.9	0.25	116.8	2.5	10	0.4	5.0	59.0	3.7	4.3	10.2
69013	7	24 9 75	30.0	20	6.22	1.3	0.26	130.2	1.0	-4	3.0	9.9	*	*	*	*
69013	8	21 1 75	21.2	13	10.47	5.9	1.20	0.	3.5	128	8.9	41.9	*	*	*	*
69013	9	8 8 74	15.9	19	6.25	1.1	0.31	93.0	0.0	32	1.5	9.6	69.0	1.8	3.1	9.9
69018	2	17 11 70	22.5	18	10.51	9.3	0.64	9.1	2.3	118	13.8	61.4	*	*	*	*
69018	4	18 10 71	44.6	21	11.35	10.7	0.37	65.9	4.8	62	20.9	46.8	*	*	*	*
69018	6	12 11 72	24.0	21	10.76	11.0	1.63	35.5	11.4	100	11.9	49.5	*	*	*	*
69019	3	16 6 74	9.7	13	2.96	3.7	0.31	74.3	1.0	51	1.8	18.6	*	*	*	*
69019	4	2 7 74	18.6	12	2.66	4.5	0.25	91.9	2.7	35	3.0	15.9	*	*	*	*
69019	6	30 4 75	23.4	11	3.58	2.4	0.48	9.0	1.4	117	4.6	19.7	*	*	*	*
69019	8	13 7 75	19.3	15	3.42	2.9	0.23	103.6	2.2	23	3.8	19.7	38.2	1.7	6.1	16.9
69019	9	8 8 75	9.4	6	2.18	2.3	0.27	124.7	1.0	1	0.9	9.8	66.0	2.6	3.9	9.0
69019	10	2 11 75	11.1	6	1.85	2.7	0.25	75.0	1.9	51	1.5	13.2	45.0	2.9	5.4	13.9
69027	1	31 3 72	27.9	27	39.50	4.9	8.13	0.7	14.4	138	11.6	41.7	*	*	*	*
69027	2	15 7 73	62.3	24	78.03	11.5	2.04	89.4	9.0	44	19.9	31.9	35.6	6.9	6.6	18.0
69027	3	15 12 73	16.6	17	19.30	7.6	3.14	0.	2.3	127	4.7	28.3	24.6	7.9	9.0	27.2
69027	4	11 8 74	17.1	9	21.61	5.4	2.61	75.9	7.4	56	4.0	23.3	31.0	7.6	8.0	19.9
69027	5	2 9 74	36.7	24	43.04	9.2	3.03	81.4	4.7	48	10.4	28.5	34.0	5.8	6.8	19.2
69027	6	7 9 74	25.6	14	24.44	5.0	4.18	67.1	7.5	65	5.2	20.2	*	*	*	*
69027	8	5 8 73	44.2	15	69.93	7.6	3.61	94.3	8.7	39	19.1	43.3	31.2	9.0	6.8	22.1
69031	1	17 11 70	22.4	19	12.16	4.5	1.59	9.1	2.7	118	10.7	47.9	28.5	5.1	7.7	23.6
69031	2	20 11 71	24.3	17	12.99	6.4	0.50	13.5	2.5	114	11.1	45.5	27.1	5.8	7.9	25.2
69031	3	15 7 73	35.9	28	13.89	7.3	0.60	79.9	6.4	51	12.1	33.6	34.4	5.4	7.0	18.3
69031	4	6 12 73	27.3	25	16.70	4.9	0.82	0.	0.2	125	13.9	51.0	32.0	4.1	6.5	21.8
69031	5	8 1 74	14.3	6	14.12	5.3	1.36	0.	4.3	129	7.1	50.0	33.6	6.1	7.8	17.5
69031	8	20 11 74	22.0	20	13.49	4.8	0.89	0.	1.2	126	11.0	53.7	27.0	4.6	7.5	23.3
69031	9	18 4 75	15.4	10	9.89	3.9	0.92	3.2	2.1	123	5.8	37.5	*	*	*	*
69031	10	1 1 76	19.4	22	17.50	4.6	2.07	27.8	13.4	110	10.3	53.0	30.7	5.0	8.4	19.4
69034	1	18 4 68	25.5	9	0.51	3.4	0.03	17.0	1.7	109	3.1	12.0	46.2	4.2	5.4	13.3
69034	4	26 11 68	21.5	16	1.39	2.9	0.11	0.	5.8	130	8.8	40.8	58.1	1.6	2.9	13.3
69034	5	25 4 69	24.5	24	0.84	1.7	0.05	2.0	2.6	125	5.4	22.0	40.5	1.7	5.8	15.8
69034	6	2 6 69	38.0	13	2.31	3.3	0.11	7.3	2.4	119	16.1	42.4	68.4	1.7	2.9	10.5
69034	7	10 9 69	19.1	14	0.32	3.6	0.02	61.9	1.7	64	1.4	7.1	56.9	1.4	3.7	13.2
69034	8	16 1 72	31.0	23	3.88	3.6	0.08	0.	5.6	130	21.4	69.1	88.0	1.9	2.2	8.3
69034	9	23 7 72	10.4	3	1.63	0.5	0.16	7.0	12.3	130	3.1	30.0	120.6	1.4	2.7	3.9
69034	11	10 11 74	24.[illegible]	22	2.28	3.5	0.07	0.	6.0	130	12.3	50.7	77.7	[illegible]	[illegible]	[illegible]
69034	13	1 1 76	35.2	10	5.41	1.4	0.09	0.	14.4	139	17.7	50.3	121.2	1.2	1.9	5.3
69802	1	21 1 70	16.1	8	6.65	3.5	0.41	0.	2.7	127	7.5	46.6	52.4	4.6	4.6	12.0
69802	2	13 8 71	16.3	12	7.65	3.8	0.57	9.1	12.7	128	10.8	66.4	48.8	3.0	4.8	13.2
70006	2	4 2 70	10.2	8	3.42	4.4	0.63	0.	4.5	129	3.4	32.9	33.6	4.0	7.7	17.7
70006	3	23 3 70	12.0	11	4.94	3.8	0.54	0.8	3.3	127	3.1	26.0	54.4	4.5	4.1	12.1
70006	4	5 4 70	11.5	12	3.11	4.5	0.36	[illegible]	0.4	121	2.0	17.1	39.2	4.6	5.5	17.4
70006	5	1 11 70	15.5	9	5.92	4.5	0.82	0.	7.8	132	4.3	27.7	40.6	4.0	4.9	17.6
70006	6	6 5 71	13.2	8	4.35	4.5	0.23	71.4	0.1	53	1.3	10.2	120.1	2.0	1.7	5.9
70006	7	9 8 71	52.7	24	23.79	5.0	0.60	85.9	10.5	49	17.7	33.5	42.8	3.8	4.5	17.0
70006	8	13 8 71	18.4	13	8.15	4.3	1.05	76.0	12.5	61	6.9	37.4	42.3	3.9	5.1	16.2
70006	9	20 11 71	20.6	20	5.11	6.7	0.42	31.1	3.5	96	10.4	50.6	35.5	4.1	5.3	20.7
71003	1	5 7 60	109.0	27	9.56	6.8	0.20	7[illegible].4	7.9	56	48.0	44.1	*	*	*	*
71003	2	1 11 60	46.7	13	10.32	3.8	0.55	0.	9.5	134	22.6	48.3	56.5	3.8	4.2	11.3
71003	3	3 8 61	61.2	18	20.36	3.4	0.24	45.9	1.5	80	26.5	43.3	92.7	2.8	2.4	7.2
71003	4	16 10 61	48.1	13	15.07	4.5	0.36	0.	3.5	128	34.3	71.2	76.3	2.4	2.7	9.2
71003	5	30 10 61	37.6	21	10.37	2.3	0.71	0.	6.5	131	27.9	74.1	60.8	2.6	3.5	11.2
71003	6	29 11 61	53.9	15	10.48	4.3	0.60	0.	10.2	135	36.9	68.5	48.7	2.8	3.7	15.4
71003	7	1 4 62	74.1	22	7.46	6.7	0.28	0.	2.5	127	37.4	50.4	38.3	3.3	3.5	12.2
71003	8	6 4 62	49.9	25	8.67	4.6	0.36	0.9	8.7	132	40.8	81.7	*	*	*	*
71003	9	22 8 62	52.2	22	12.64	2.3	0.57	20.6	10.0	114	24.9	47.6	70.9	3.8	2.9	9.9
71003	10	25 9 63	56.3	25	14.57	3.4	0.36	0.	18.4	143	27.5	48.9	59.4	1.7	3.4	11.9
71003	11	2 10 63	35.1	11	12.08	3.4	0.65	0.	6.3	131	28.2	80.4	*	*	*	*
71003	13	7 7 64	56.4	19	6.12	3.2	0.18	32.5	0.2	92	15.1	26.7	44.5	3.4	5.1	14.8
71003	14	8 12 64	76.2	14	12.22	3.2	0.66	0.	27.1	152	33.6	44.1	53.4	3.2	4.1	12.6
71003	15	11 12 64	115.3	38	11.83	7.7	0.42	0.	12.2	137	65.6	56.9	39.1	2.8	7.3	13.9
71003	16	8 12 65	43.6	16	13.89	5.2	2.23	0.	11.2	136	29.2	67.1	61.6	2.7	4.0	10.1
71003	17	18 12 66	70.0	20	13.31	4.3	0.52	0.	7.4	132	51.9	74.2	*	*	*	*
71003	18	22 2 67	45.3	10	11.59	4.1	0.43	0.	5.0	130	22.1	48.8	*	*	*	*
71003	19	27 2 67	61.9	17	12.69	4.9	0.53	0.	7.0	132	44.4	71.7	*	*	*	*
71003	20	8 8 67	53.1	5	29.64	2.5	0.64	4.8	4.0	124	30.8	58.0	93.7	2.3	3.1	5.6
71003	21	16 10 67	72.6	23	11.82	5.1	0.60	0.	22.8	147	28.5	39.3	56.4	3.1	3.4	13.0
71003	23	1 7 68	26.5	15	4.49	3.1	0.38	0.	5.5	130	7.5	28.4	51.0	2.3	4.4	13.0
71003	24	29 9 [illegible]	21.6	10	10.22	1.8	0.82	0.	12.8	137	14.0	64.9	45.5	2.8	3.3	17.9
71003	25	30 3 69	47.9	18	8.67	2.1	0.67	0.6	4.5	128	27.9	58.2	49.9	3.3	5.6	11.0
71003	26	2 7 68	24.4	15	11.08	2.3	0.82	0.	19.0	143	20.1	82.3	*	*	*	*
71004	1	21 1 70	18.3	25	81.83	3.1	15.78	0.	1.7	126	8.1	44.2	30.2	4.4	7.5	21.8
71004	2	12 4 70	27.5	18	97.80	5.8	12.00	4.9	0.4	120	11.8	43.0	*	*	*	*
71004	3	24 4 70	15.6	23	70.13	11.1	17.23	1.5	6.8	130	7.9	50.5	*	*	*	*
71004	4	11 6 70	18.7	3	92.42	3.2	12.02	92.3	0.1	32	4.0	21.4	*	*	*	*
71004	5	11 8 74	16.8	22	60.90	5.1	5.42	36.4	12.9	101	5.6	33.4	33.4	5.0	6.5	20.3
71004	6	23 11 74	30.9	46	105.58	4.9	9.48	0.	1.7	126	12.7	41.1	33.5	5.1	6.0	21.2
71004	7	24 1 75	16.6	11	70.82	6.1	11.63	0.	6.3	131	6.7	40.4	*	*	*	*
71004	8	30 4 75	29.9	26	87.73	5.9	3.61	7.3	1.9	119	9.8	32.7	32.0	4.9	7.1	20.5
71004	9	14 11 75	20.1	34	29.91	5.4	3.30	2.2	0.0	122	4.6	22.9	21.0	6.4	10.7	31.6
71004	10	1 12 75	51.2	24	110.59	6.8	8.84	0.	6.2	131	26.9	52.5	*	*	*	*
71008	2	[illegible]	14.7	10	58.12	7.4	5.04	0.	1.5	126	6.8	45.9	34.5	5.0	6.4	19.4
71008	3	[illegible]	54.5	31	176.45	5.9	10.34	0.	6.1	131	35.4	64.9	32.5	4.8	6.4	21.4
71008	5	[illegible]	33.4	32	37.83	[illegible]	2.64	22.8	0.	102	4.8	14.4	30.5	3.9	7.9	20.7
71008	6	[illegible]	27.2	12	162.65	4.0	8.27	0.1	3.9	128	74.2	32.3	45.6	4.0	5.0	14.4
71008	7	1 10 74	20.5	11	71.25	5.9	4.70	2.2	0.7	123	6.0	29.1	37.4	5.3	6.4	16.9
71008	8	[illegible] 4 72	30.1	23	54.92	7.6	2.68	9.7	2.1	117	7.8	25.9	28.5	5.2	7.1	24.8
71008	9	14 11 75	24.3	34	56.98	5.6	2.57	1.8	0.5	123	7.8	32.3	28.5	5.1	7.5	24.0
71008	10	30 11 75	64.7	36	125.46	4.3	7.75	0.	3.1	128	29.7	45.9	30.7	4.6	8.6	19.0
71802	1	18 12 66	38.4	26	131.85	7.5	8.67	0.	8.5	135	31.0	80.8	24.5	7.1	10.1	25.2

CATCH NO	EV NO	DATE OF STORM	RAINFALL TOTAL (MM)	RAINFALL DURN (H)	PEAK FLOW (CUMECS)	LAG (H)	ANSF (CUMECS)	SMD (MM)	APIS (MM)	CWI (MM)	RUNOFF (MM)	RUNOFF %	1-HOUR UNIT HYDROGRAPH: UH PEAK (CUMECS PER 100 SQ KMS)	TIME TO PEAK (H)	WIDTH AT 0.5 PEAK (H)	UH TIME BASE (H)
71802	6	18 3 68	62.0	34	122.02	4.8	12.27	0.	6.4	131	41.7	67.3	23.6	7.4	9.5	28.1
71802	[illegible]	30 10 68	54.0	50	133.47	5.8	9.64	1.0	7.9	131	36.7	68.0	32.5	8.6	8.8	16.6
71802	9	30 3 69	52.0	23	142.41	7.9	6.26	0.	5.0	130	29.8	57.3	*	*	*	*
71804	1	5 7 60	108.5	39	25.16	1.9	0.53	79.4	7.2	52	64.5	59.4	87.4	2.3	2.6	7.6
71804	2	3 8 61	63.1	18	33.13	2.4	0.43	45.9	1.1	80	21.0	33.3	64.6	1.8	3.1	10.9
71804	3	22 8 62	60.5	23	27.47	0.5	1.06	20.0	9.2	114	18.4	30.4	120.0	1.8	1.8	5.8
71804	4	25 9 63	63.4	25	24.15	2.4	0.57	0.	16.0	141	18.7	29.4	80.2	2.0	2.1	9.7
71804	5	20 11 63	59.3	15	21.85	1.6	0.87	0.	10.6	135	[illegible]	19.6	[illegible]	2.1	2.6	7.7
71804	6	8 12 64	73.7	29	22.84	3.3	0.98	0.	32.5	157	27.6	37.4	56.8	2.6	3.0	13.6
72002	2	14 12 62	27.0	24	99.48	6.9	4.69	0.	3.4	128	15.7	58.1	28.5	5.8	8.5	22.0
72002	3	25 9 63	38.2	14	131.13	6.0	8.42	0.	13.3	138	16.9	44.1	29.6	5.8	7.9	21.8
72002	4	2 10 63	31.5	11	138.87	6.1	10.21	0.	6.4	131	17.2	54.5	31.4	5.6	7.6	20.2
72002	5	20 11 63	31.2	13	118.26	5.8	9.83	0.	6.9	131	16.5	52.9	29.9	5.6	8.2	20.8
72002	6	10 5 64	36.8	18	134.79	6.0	5.87	3.6	6.7	128	20.7	56.3	28.0	4.8	8.8	22.1
72002	7	8 12 64	39.8	15	142.71	5.1	13.60	0.	16.8	141	24.5	61.7	26.8	6.3	8.5	26.5
72002	8	8 1 65	61.6	43	120.75	8.7	9.09	0.	11.3	136	41.6	67.8	23.5	7.0	9.0	29.3
72002	9	9 9 65	29.6	18	145.56	6.4	12.33	0.	10.2	133	22.5	75.8	29.5	6.0	7.4	22.9
72002	10	7 12 65	38.0	41	[illegible]	[illegible]	6.32	0.	6.6	131	25.0	65.9	28.0	5.8	8.8	22.1
72002	11	16 12 65	41.9	47	[illegible]	[illegible]	8.14	0.	3.3	128	27.0	64.5	26.6	6.2	9.7	22.4
72002	12	25 6 66	44.4	22	[illegible]	[illegible]	6.81	10.0	6.2	121	25.6	57.7	24.6	4.4	10.5	24.2
72002	20	[illegible]	68.9	41	[illegible]	[illegible]	16.45	0.	10.8	135	59.4	86.2	27.0	4.9	6.5	28.2
72002	21	[illegible]	35.1	21	89.74	5.8	7.83	0.	1.8	126	19.5	55.6	27.3	6.4	7.9	24.9
72002	22	2 3 69	44.1	14	166.64	6.6	6.77	5.3	1.1	117	26.5	60.1	28.5	5.0	8.5	22.0
72006	1	16 9 70	37.8	14	280.63	7.3	10.09	20.4	1.9	106	18.9	50.0	43.6	7.0	5.6	14.4
72006	2	31 10 70	15.0	8	258.90	7.8	28.63	0.	24.3	149	11.3	75.3	32.0	7.9	7.6	19.5
72006	3	11 2 71	51.6	26	285.25	11.1	7.62	0.8	0.6	124	32.0	62.0	*	*	*	*
72006	4	20 11 71	25.5	16	161.98	3.6	12.04	0.3	2.3	127	12.1	47.4	29.4	[illegible]	7.2	23.4
72006	5	18 1 72	26.7	17	274.96	6.7	14.29	0.	2.5	127	16.3	61.0	30.8	5.3	8.4	19.3
72006	6	3 7 72	54.2	36	207.83	6.8	13.68	8.5	0.8	117	28.1	51.9	*	*	*	*
72006	10	30 4 75	19.9	13	162.83	6.6	14.87	1.0	4.4	128	12.2	61.4	*	*	*	*
72006	11	24 9 75	64.6	28	492.98	6.9	25.72	0.7	4.9	129	53.3	82.5	33.3	6.1	7.3	[illegible]
72818	1	25 1 73	20.8	9	12.96	7.8	0.69	0.	2.6	127	6.0	28.7	30.5	7.8	7.8	20.9
72818	2	3 4 73	23.1	7	17.13	5.3	0.87	0.	9.7	134	6.3	27.3	36.5	5.1	6.7	17.1
72818	3	7 12 73	17.7	10	9.04	8.0	0.49	0.	0.6	125	4.3	24.4	28.2	8.5	9.3	20.8
72818	4	19 12 73	17.6	15	9.58	5.9	1.23	0.	4.0	128	6.1	34.9	26.8	4.4	8.6	24.3
72818	6	24 9 74	17.5	14	7.31	9.6	0.56	0.7	3.8	128	5.4	30.8	23.7	8.8	9.9	27.1
72818	7	6 1 75	17.9	8	6.88	6.9	0.55	0.	0.6	125	3.3	18.5	31.2	8.0	7.9	19.0
72818	8	11 1 75	11.9	6	6.96	6.2	0.75	0.	2.5	127	2.7	22.9	33.0	6.2	7.4	18.9
72818	9	16 2 75	13.4	6	10.83	5.9	0.77	0.	2.2	127	3.8	28.4	37.5	6.2	6.3	17.1
72818	10	18 4 75	11.8	11	6.57	7.3	0.62	1.7	3.9	127	2.7	22.6	34.4	4.9	6.5	19.3
72820	1	3 4 73	66.1	16	0.54	4.9	0.04	0.5	7.7	132	28.6	43.5	*	*	*	*
72820	2	4 8 73	16.1	10	0.07	4.0	0.00	54.5	5.2	75	2.3	14.5	46.1	3.8	4.0	16.2
72820	3	5 8 73	49.2	22	0.42	3.1	0.03	28.7	9.6	105	19.9	40.4	40.1	1.8	3.8	20.1
72820	4	[illegible] 11 73	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	22.5	[illegible]	[illegible]	37.6	48.9	33.4	1.0	4.6	27.4
72820	5	11 11 73	53.5	26	0.36	2.7	0.05	10.8	30.8	144	18.9	35.3	*	*	*	*
72820	6	15 12 73	28.3	11	[illegible]	3.2	0.05	0.	4.5	129	5.5	19.0	41.8	4.6	6.0	14.5
72820	8	15 7 74	20.4	13	0.43	1.9	0.04	51.2	2.4	76	7.6	37.5	43.3	1.0	2.9	19.9
72820	9	8 8 74	29.4	5	0.33	1.0	0.04	68.0	0.4	57	1.9	6.5	*	*	*	*
72820	10	7 9 74	24.6	12	0.40	[illegible]	0.11	62.9	[illegible]	79	10.8	47.7	43.1	1.0	3.8	18.2
73005	1	19 2 70	[illegible]	[illegible]	86.82	4.6	10.23	0.	23.1	168	15.3	48.7	27.9	6.5	7.6	24.7
73005	2	17 6 72	54.8	15	72.00	6.4	3.95	15.4	0.8	110	12.7	23.2	29.5	7.2	7.6	22.5
73005	3	3 7 72	[illegible]	39	92.13	10.7	7.94	7.6	0.3	117	27.8	36.0	25.5	5.5	8.0	27.6
73005	4	29 11 72	45.2	18	84.02	6.2	9.36	0.	5.0	129	19.1	42.3	28.2	7.0	7.6	24.2
73005	5	8 11 73	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
73005	6	17 10 74	30.3	17	34.42	5.4	5.46	0.3	1.8	126	5.8	19.1	26.4	7.1	9.0	24.1
73005	7	10 11 74	33.7	14	87.69	11.0	14.29	0.	10.6	135	13.5	40.0	*	*	*	*
73005	8	21 1 75	64.9	23	148.25	7.6	18.53	0.	8.2	133	29.8	45.9	28.3	6.9	7.4	24.5
73005	9	16 2 75	30.1	23	52.55	7.2	5.14	0.1	3.6	128	8.4	27.8	30.7	4.7	6.6	23.0
73005	11	21 7 75	82.3	33	74.29	10.9	3.97	73.1	2.9	54	22.7	27.5	21.5	4.0	9.1	33.5
73005	12	24 9 75	64.7	18	119.44	7.1	5.23	1.1	5.6	129	26.5	41.0	25.2	6.0	9.2	25.7
73007	2	30 8 70	38.4	9	13.22	3.5	0.70	[illegible]	0.0	35	10.2	26.6	*	*	*	*
73007	4	18 1 72	53.1	20	23.34	5.3	1.42	[illegible]	11.3	136	19.1	36.0	43.5	4.3	4.8	16.0
73007	6	8 11 72	89.2	19	38.81	4.9	1.05	1.5	1.7	125	47.6	53.4	46.2	3.6	5.4	13.3
73007	9	28 12 74	44.1	14	30.67	2.4	2.77	0.	14.2	139	25.4	57.5	54.4	4.0	4.0	12.4
73007	10	16 2 75	40.9	24	15.75	7.3	0.59	0.0	2.1	127	16.6	40.7	44.0	3.6	4.5	16.3
73008	1	21 6 70	66.2	30	46.38	10.4	5.79	0.5	3.2	127	32.2	48.6	*	*	*	*
73008	2	[illegible] 11 70	38.3	23	27.26	7.2	3.00	0.	6.9	131	12.5	32.5	*	*	*	*
73008	3	[illegible] 11 71	27.8	18	19.90	9.7	2.80	9.3	2.6	127	6.9	24.7	*	*	*	*
73008	5	[illegible]	50.8	37	25.54	15.8	3.53	8.3	0.5	117	21.0	41.2	*	*	*	*
73008	6	[illegible] 11 72	27.4	12	26.12	5.9	8.74	0.	14.0	138	6.2	22.8	24.3	4.6	9.2	27.4
73008	[illegible]	[illegible]	[illegible]	7	26.13	5.8	10.94	0.	14.0	139	4.0	21.6	29.0	5.6	7.7	22.9
73008	8	[illegible]	[illegible]	[illegible]	25.04	5.2	3.79	0.4	8.4	133	7.1	23.9	25.9	4.2	9.5	23.9
73008	9	[illegible]	66.4	[illegible]	40.97	5.0	8.80	0.	5.0	130	16.6	35.8	22.5	4.8	7.8	34.3
73803	[illegible]	27 11 70	29.4	[illegible]	6.06	5.9	1.75	0.	14.5	139	13.0	51.2	*	*	*	*
73803	4	[illegible] 1 73	[illegible]	[illegible]	9.73	5.6	1.75	0.	10.7	135	35.6	63.2	*	*	*	*
73803	[illegible]	21 12 74	[illegible]	15	[illegible]	10.1	2.07	0.	14.0	139	21.8	69.4	13.1	9.9	18.0	[illegible]
73803	6	[illegible] 9 74	[illegible]	38	[illegible]	[illegible]	1.91	0.	20.6	145	32.7	77.1	*	*	*	*
73804	1	3 2 56	95.7	[illegible]	[illegible]	13.[illegible]	[illegible]	0.	13.2	138	70.8	73.9	19.8	6.9	10.7	34.8
73804	2	26 2 66	50.7	9	[illegible]	[illegible]	[illegible]	0.	26.3	151	32.0	63.2	26.9	7.0	8.2	24.9
73804	3	20 5 66	95.6	55	54.91	11.2	3.23	3.6	[illegible]	130	81.7	85.4	*	*	*	*
73804	4	12 8 66	65.7	26	73.92	[illegible]	[illegible]	8.3	[illegible]	[illegible]	[illegible]	90.5	*	*	*	*
73804	5	5 9 66	100.8	[illegible]	[illegible]	[illegible]	2.51	0.	[illegible]	146	[illegible]	[illegible]	*	*	*	*
73804	6	29 11 66	62.9	26	44.34	[illegible]	3.69	0.	9.2	136	40.5	64.4	28.8	6.1	[illegible]	23.0
73804	7	30 11 66	[illegible]	34	66.20	[illegible]	7.17	0.	39.4	164	53.5	62.0	20.3	8.2	12.1	30.6
73804	9	26 2 67	[illegible]	[illegible]	[illegible]	4.7	6.71	0.	10.6	135	53.9	77.3	21.4	8.8	10.4	30.8
73804	10	29 7 67	103.6	41	[illegible]	12.[illegible]	3.13	6.9	3.9	122	[illegible]	[illegible]	*	*	*	*
73804	11	2 10 67	73.5	37	54.03	7.7	8.34	0.	60.9	145	[illegible]	[illegible]	16.7	[illegible]	14.1	33.4
73804	12	3 10 67	71.3	33	33.61	[illegible]	2.57	0.8	17.0	141	46.4	[illegible]	32.5	3.0	10.5	28.4
73804	[illegible]	16 10 67	74.7	18	65.41	7.2	6.69	0.8	23.5	147	49.[illegible]	[illegible]	21.7	5.5	9.0	27.0
73804	[illegible]	20 [illegible] 69	97.0	[illegible]	[illegible]	12.[illegible]	3.22	0.2	3.8	128	72.4	74.6	23.0	9.9	8.6	27.3
74001	3	1 7 68	87.5	39	90.[illegible]	[illegible]	[illegible]	15.8	0.9	110	48.6	55.6	*	*	*	*
74001	4	19 9 68	77.4	31	67.86	10.5	[illegible]	6.3	0.	118	[illegible]	63.8	*	*	*	*
74001	7	22 11 68	30.6	12	42.79	3.2	6.61	0.	11.8	136	[illegible]	56.0	*	*	*	*

CATCH NO	EV NO	DATE OF STORM	RAINFALL TOTAL (MM)	RAINFALL DURN (H)	PEAK FLOW (CUMECS)	LAG (H)	ANSF (CUMECS)	SMD (MM)	APIS (MM)	CWI (MM)	RUNOFF (MM)	RUNOFF %	1-HOUR UNIT HYDROGRAPH: UH PEAK (CUMECS PER 100 SQ KMS)	TIME TO PEAK (H)	WIDTH AT 0.5 PEAK (H)	UH TIME BASE (H)
74001	3	19 12 68	45.1	16	59.77	5.4	3.96	0.	4.3	129	28.5	63.7	*	*	*	*
74001	9	20 1 69	85.6	63	119.12	6.1	5.04	0.2	3.6	128	[illegible]	77.2	*	*	*	*
74001	10	13 12 69	60.1	20	102.78	5.7	3.62	0.2	0.9	125	[illegible]	[illegible]	*	*	*	*
74001	12	18 1 72	55.7	19	154.82	6.3	6.34	0.	14.6	139	39.5	70.2	*	*	*	*
75006	2	10 11 74	53.7	16	43.19	4.5	4.77	[illegible]	16.8	141	32.0	59.6	42.1	[illegible]	5.2	16.0
75006	3	19 1 75	36.2	11	37.09	5.4	2.89	[illegible]	3.5	130	26.6	73.4	32.7	[illegible]	5.1	15.8
75006	4	13 1 75	[illegible]	14	37.19	4.6	[illegible]	[illegible]	16.5	141	30.0	65.8	*	*	*	*
75006	5	26 1 75	58.2	25	43.05	4.8	4.76	0.	23.5	148	55.1	94.7	*	*	*	*
75006	8	24 9 75	71.4	14	33.02	10.6	2.47	19.1	8.4	114	65.5	91.7	*	*	*	*
75006	9	2 1 76	40.2	12	27.[illegible]	4.9	[illegible]	0.	13.6	139	21.9	54.5	*	*	*	*
75006	10	27 11 76	35.9	8	42.15	[illegible]	6.21	0.	22.4	147	22.7	52.3	48.5	3.[illegible]	[illegible]	[illegible]
75007	1	9 1 74	28.0	14	40.85	3.7	4.52	0.	11.2	136	18.6	66.8	49.[illegible]	3.0	4.4	13.5
75007	2	10 11 74	44.1	17	60.16	5.8	4.22	0.	18.6	143	27.4	62.2	48.6	4.0	[illegible]	13.6
75007	3	23 11 74	48.6	24	[illegible]	4.5	3.03	0.	5.1	130	31.3	64.4	40.6	3.9	[illegible]	[illegible]
75007	4	28 12 74	31.6	[illegible]	45.82	7.7	4.72	0.	10.5	135	16.8	53.1	44.6	3.8	4.0	15.0
75007	5	13 1 75	37.5	16	53.26	5.7	6.34	0.	10.2	135	19.1	50.9	51.7	4.0	4.8	[illegible]
75007	6	24 1 75	41.3	[illegible]	[illegible]	3.5	[illegible]	0.	9.3	134	17.5	42.3	*	*	*	*
75007	7	24 9 75	[illegible]	15	62.51	5.3	[illegible]	19.2	3.9	109	20.5	38.8	*	*	*	*
75007	8	26 9 75	[illegible]	15	62.39	4.1	4.01	13.8	13.2	126	18.3	53.3	47.0	5.0	4.8	[illegible]
76005	1	22 1[illegible] [illegible]	33.5	20	205.84	12.[illegible]	20.79	0.	3.7	128	[illegible]	65.9	*	*	*	*
76008	1	29 10 [illegible]	23.7	13	101.92	[illegible]	16.39	0.	[illegible]	117	12.4	52.4	38.5	5.5	6.9	15.9
76008	2	30 10 [illegible]	28.5	26	169.99	7.4	[illegible]	0.	20.5	145	16.5	54.5	31.0	7.0	7.6	20.7
76011	8	11 8 67	17.2	5	1.06	3.0	0.08	0.4	10.9	135	11.6	67.7	62.2	2.8	4.0	[illegible]
76011	13	1 10 67	23.4	11	[illegible]	3.9	0.04	0.6	4.2	128	17.1	77.0	55.4	3.1	3.4	[illegible]
76011	14	2 10 67	27.4	24	0.90	[illegible]	0.06	0.	25.3	150	18.9	68.8	51.7	[illegible]	4.0	[illegible]
76011	15	6 10 67	41.0	16	1.50	2.5	[illegible]	1.0	7.8	131	26.8	70.3	61.9	[illegible]	[illegible]	12.2
76011	16	8 10 67	[illegible]	24	2.69	[illegible]	[illegible]	0.	13.1	138	59.9	84.0	55.5	1.5	4.7	10.7
76011	17	15 10 67	48.4	15	1.75	3.6	[illegible]	0.2	[illegible]	130	35.2	72.7	51.9	2.3	2.8	12.3
76011	19	1 11 67	33.4	20	1.34	2.4	[illegible]	1.0	1.2	125	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
76011	22	18 3 68	34.5	39	3.92	3.1	0.05	0.	7.9	132	27.4	79.6	50.7	2.7	3.9	14.2
76011	24	[illegible] 3 68	[illegible]	[illegible]	1.24	[illegible]	0.16	0.	10.8	135	[illegible]	[illegible]	63.1	2.6	3.1	[illegible]
76011	[illegible]	13 [illegible]	46.0	16	0.87	[illegible]	0.04	45.1	3.6	83	[illegible]	30.3	33.6	4.8	6.3	20.6
76011	[illegible]	12 [illegible]	33.9	[illegible]	1.37	[illegible]	[illegible]	11.2	[illegible]	[illegible]	[illegible]	[illegible]	63.6	[illegible]	2.9	12.0
76011	[illegible]	[illegible] 69	65.5	[illegible]	[illegible]	[illegible]	[illegible]	50.1	[illegible]	[illegible]	58.5	[illegible]	30.6	7.0	3.8	14.4
76011	[illegible]	20 [illegible] 70	21.7	25	[illegible]	5.1	0.02	51.6	[illegible]	76	15.9	[illegible]	56.4	[illegible]	[illegible]	9.2
76011	[illegible]	[illegible] 70	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	*	*	*	*
76011	[illegible]	[illegible] 10 72	34.6	24	2.11	[illegible]	0.07	0.	[illegible]	143	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
76014	1	28 12 74	20.5	7	[illegible]	3.0	[illegible]	0.	7.0	132	[illegible]	[illegible]	[illegible]	3.9	4.5	12.[illegible]
76014	2	10 1 75	15.0	7	[illegible]	4.9	2.66	0.	0.8	125	[illegible]	50.0	[illegible]	[illegible]	[illegible]	17.1
76014	3	24 1 75	27.2	10	[illegible]	3.6	5.19	0.	8.3	133	22.4	22.4	58.0	[illegible]	[illegible]	[illegible]
76014	5	26 9 75	29.7	9	[illegible]	3.8	[illegible]	[illegible]	14.8	105	27.9	[illegible]	[illegible]	2.9	[illegible]	[illegible]
76014	[illegible]	2 10 75	20.2	12	[illegible]	3.5	3.71	[illegible]	7.2	107	12.0	59.4	37.5	4.2	[illegible]	[illegible]
76014	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	127	[illegible]	[illegible]	*	*	*	*
76014	10	3 4 76	15.7	[illegible]	30.85	4.7	[illegible]	0.9	4.5	128	8.9	56.8	44.0	[illegible]	5.9	13.5
76014	11	17 10 71	13.2	[illegible]	[illegible]	2.9	5.84	51.4	9.7	83	7.6	57.7	50.0	[illegible]	[illegible]	12.8
76014	12	6 11 71	17.5	[illegible]	[illegible]	4.0	3.02	[illegible]	8.0	101	8.2	46.8	46.2	[illegible]	5.0	14.1
76014	13	18 1 72	[illegible]	10	[illegible]	2.9	[illegible]	0.	0.9	125	20.0	58.5	58.0	4.5	5.1	9.0
76014	14	25 1 72	[illegible]	[illegible]	[illegible]	0.7	[illegible]	0.	3.8	128	[illegible]	[illegible]	66.4	3.7	3.9	6.9
76014	18	9 11 72	60.0	[illegible]	[illegible]	1.2	1.80	73.0	2.4	54	49.3	82.2	59.5	2.9	3.2	[illegible]
76014	19	30 11 72	29.7	10	[illegible]	2.9	[illegible]	0.	11.6	136	23.1	77.8	72.9	4.0	4.0	[illegible]
76014	20	4 12 72	17.3	6	31.02	4.3	[illegible]	0.	11.1	136	[illegible]	70.9	[illegible]	4.4	5.6	14.7
76014	24	16 7 73	15.1	3	30.31	3.0	3.47	70.7	7.3	61	[illegible]	42.5	32.8	3.8	4.6	11.9
76014	26	5 8 73	49.8	[illegible]	108.35	3.3	2.38	74.7	5.4	55	32.[illegible]	65.9	[illegible]	3.8	4.2	11.8
76805	1	5 8 73	[illegible]	14	4.23	2.9	0.24	28.7	7.2	103	[illegible]	[illegible]	[illegible]	[illegible]	6.7	16.2
76805	2	11 11 73	17.4	15	0.65	5.5	[illegible]	8.0	1.8	118	7.3	42.1	23.9	[illegible]	10.6	25.4
76805	3	29 1 74	74.8	32	[illegible]	3.4	0.28	[illegible]	8.6	133	44.5	59.4	35.5	1.7	[illegible]	17.8
76805	4	8 8 74	18.5	6	0.33	2.8	0.06	69.[illegible]	0.	55	0.8	[illegible]	35.5	0.9	4.3	19.6
76805	5	10 11 74	47.6	16	4.83	2.0	0.32	12.9	9.5	121	30.5	64.1	43.7	1.0	5.0	14.3
76805	6	13 11 74	29.6	9	3.03	5.5	0.26	5.2	9.1	128	18.[illegible]	63.7	42.9	2.[illegible]	4.3	17.4
76805	7	21 12 74	54.3	11	4.45	2.4	0.63	[illegible]	19.3	144	39.1	72.0	38.5	1.2	6.5	[illegible]
76805	8	19 1 75	35.0	[illegible]	3.03	0.9	0.32	0.	3.7	130	18.9	54.0	52.6	1.8	4.6	12.0
76805	9	21 1 75	59.5	17	[illegible]	4.5	0.27	0.	11.8	136	[illegible]	75.1	38.4	[illegible]	6.3	16.4
76805	10	24 1 75	37.3	12	[illegible]	2.4	0.28	0.	8.8	133	[illegible]	57.4	40.6	[illegible]	5.9	15.6
76805	11	30 1 75	43.0	13	2.70	[illegible]	0.35	0.	3.8	130	[illegible]	47.2	42.5	2.8	5.4	15.4
77002	1	[illegible] 3 63	57.7	28	558.80	4.0	37.34	0.	1.6	126	[illegible]	55.7	40.9	5.1	6.1	15.0
77002	2	17 11 63	46.4	21	311.03	[illegible]	30.18	0.2	3.7	128	27.5	59.3	28.7	6.3	7.2	24.3
77002	[illegible]	5 10 64	74.9	49	526.39	9.6	[illegible]	5.4	0.	119	[illegible]	59.0	37.9	5.5	[illegible]	19.1
77002	5	12 8 66	39.9	22	343.92	9.4	18.89	6.0	8.3	127	23.5	58.9	*	*	*	*
77002	6	3 9 66	55.6	21	464.36	[illegible]	[illegible]	0.	11.1	135	[illegible]	45.3	[illegible]	[illegible]	3.8	[illegible]
77002	7	31 7 67	37.5	14	320.93	5.0	22.38	3.6	14.7	136	14.3	38.1	*	*	*	*
77002	[illegible]	8 10 67	[illegible]	23	[illegible]	[illegible]	19.62	0.	11.[illegible]	136	52.9	66.5	40.4	5.5	[illegible]	13.1
83002	8	[illegible] 10 67	50.3	20	51.76	2.6	[illegible]	0.	[illegible]	140	29.4	58.5	*	*	*	*
84002	4	11 12 64	[illegible]	11	14.94	[illegible]	[illegible]	0.	6.9	[illegible]	27.5	[illegible]	50.8	[illegible]	5.0	11.9
84002	7	24 6 65	35.7	12	14.59	3.0	[illegible]	0.	15.6	140	22.2	62.0	56.0	3.0	4.3	11.3
84002	[illegible]	[illegible] 9 65	60.4	32	15.48	2.6	0.23	3.0	0.2	122	44.0	[illegible]	61.6	[illegible]	4.4	9.3
84002	12	1 3 71	28.6	10	9.98	4.0	0.44	0.	6.4	131	17.9	62.7	49.6	2.5	4.8	12.8
84008	1	1 10 [illegible]	19.5	[illegible]	[illegible]	3.2	2.53	0.	[illegible]	129	9.0	46.1	48.4	3.3	5.2	12.6
84008	2	8 10 67	37.3	19	28.16	5.0	[illegible]	0.	12.2	137	27.9	74.7	*	*	*	*
84008	3	25 10 67	38.1	32	24.07	10.2	2.12	0.	[illegible]	132	21.0	55.2	28.5	3.8	[illegible]	[illegible]
84008	4	22 12 67	18.5	23	26.91	4.8	2.13	0.	3.6	120	16.5	[illegible]	[illegible]	3.9	4.3	39.3
84008	5	4 5 68	66.8	43	35.95	8.8	[illegible]	2.0	9.1	132	[illegible]	66.8	*	*	*	*
84008	6	2 7 68	47.7	25	24.20	3.2	1.38	53.5	13.[illegible]	84	16.0	33.6	34.0	4.4	6.4	20.0
84008	7	21 12 68	[illegible]	21	[illegible]	4.3	[illegible]	[illegible]	2.4	[illegible]	10.0	50.9	[illegible]	3.9	[illegible]	17.4
84012	2	[illegible] 10 65	59.5	37	[illegible]	6.3	13.78	0.2	[illegible]	138	33.4	56.2	[illegible]	[illegible]	[illegible]	17.3
84012	3	13 8 66	48.4	19	[illegible]	6.4	[illegible]	18.1	4.1	111	23.4	48.4	[illegible]	5.2	[illegible]	[illegible]
84012	4	[illegible] 12 66	48.8	[illegible]	[illegible]	9.2	[illegible]	0.	3.2	128	[illegible]	69.0	[illegible]	[illegible]	6.6	[illegible]
84012	5	18 12 66	29.6	[illegible]	[illegible]	6.9	14.67	[illegible]	18.8	143	18.5	63.4	[illegible]	[illegible]	6.6	21.5
84012	6	8 10 67	42.5	[illegible]	[illegible]	12.1	[illegible]	0.	15.4	140	32.6	76.7	*	*	*	*
84012	7	4 5 68	66.1	43	[illegible]	[illegible]	9.65	2.0	[illegible]	128	35.8	54.2	*	*	*	*
84022	6	6 11 71	24.2	15	31.82	6.2	[illegible]	0.	2.2	127	9.4	38.7	35.8	4.6	5.0	21.0
84022	7	18 12 71	17.9	[illegible]	21.56	4.0	[illegible]	0.1	0.3	125	4.2	23.2	46.8	3.2	4.6	14.5

CATCH NO	EV NO	DATE OF STORM	RAINFALL TOTAL (MM)	RAINFALL DURN (H)	PEAK FLOW (CUMECS)	LAG (HR)	ANSF (CUMECS)	SMD (MM)	API5 (MM)	CWI	RUNOFF (MM)	RUNOFF %	1-HOUR UNIT HYDROGRAPH: UH PEAK (CUMECS PER 100 SQ KMS)	TIME TO PEAK (H)	WIDTH AT 0.5 PEAK (H)	UH TIME BASE (H)
84022	8	12 1 72	24.0	[illegible]	30.8[illegible]	4.2	6.52	0.	14.7	[illegible]	13.0	45.0	[illegible]	*	*	*
84022	9	11 [illegible]2 72	52.9	[illegible]	73.92	5.0	3.71	0.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	*	*	*
84022	10	23 [illegible] 73	16.6	5	[illegible]	2.9	[illegible]	0.	3.6	123	2.[illegible]	[illegible]	54.5	3.3	4.5	11.8
84022	11	25 1 74	76.[illegible]	[illegible]	52.[illegible]	3.3	[illegible]	0.	5.7	130	33.8	36.1	*	*	*	*
84022	12	12 [illegible] 75	[illegible]	[illegible]	25.0[illegible]	5.2	[illegible].62	1.2	[illegible]	125	4.6	20.0	47.3	2.8	4.0	15.[illegible]
85002	8	13 [illegible]	[illegible]	12	86.22	4.2	[illegible]	[illegible]	4.4	131	11.[illegible]	39.7	31.[illegible]	[illegible]	6.0	17.4
85002	9	5 3 68	70.5	30	106.30	7.3	[illegible].10	[illegible]	10.0	135	26.[illegible]	65.6	29.0	3.9	7.7	22.8
85002	10	9 [illegible]0 68	37.2	21	80.47	5.9	[illegible].79	4.1	1.5	122	16.2	50.4	28.3	6.9	7.6	[illegible]
85002	11	[illegible] [illegible]0 69	31.3	22	100.[illegible]4	5.6	10.46	0.	10.6	135	17.4	55.7	29.3	4.6	[illegible]	21.7
99001	1	26 [illegible] 56	22.[illegible]	18	7[illegible].85	22.1	18.12	0.	3.1	128	8.8	39.4	9.6	21.0	26.4	62.0
99001	2	29 [illegible] 56	59.8	[illegible]	101.35	24.2	26.55	[illegible]	5.6	130	30.8	51.5	5.8	17.5	31.1	130.8
99001	3	5 [illegible] 57	62.9	13[illegible]	99.07	[illegible]	20.21	0.	2.8	127	32.2	51.3	6.5	16.5	35.9	101.6
99001	4	10 [illegible] 63	42.0	[illegible]	85.95	17.4	12.44	1.0	5.1	129	20.0	46.7	5.7	22.5	46.0	106.2
99001	5	11 [illegible] 60	52.6	132	100.45	17.9	26.59	[illegible]	9.1	134	22.9	43.5	6.0	16.5	42.7	100.7
99001	6	16 3 64	74.4	216	80.09	28.2	8.73	1.0	3.0	126	37.9	50.9	5.5	20.5	33.2	134.6
99001	7	10 [illegible] 66	45.[illegible]	78	102.51	29.0	77.79	0.	6.8	129	23.3	51.6	5.7	22.5	40.1	114.0
99001	8	[illegible] [illegible] 68	32.1	42	94.90	20.9	21.85	0.	12.6	137	14.3	44.7	7.3	26.5	36.3	79.0
99001	10	[illegible] 3 69	104.5	240	124.3[illegible]	37.[illegible]	16.42	0.	0.4	125	62.6	59.9	[illegible]	17.5	38.9	137.2

WHERE THE DATA INTERVAL DIFFERS FROM ONE HOUR THE UNIT HYDROGRAPH PARAMETERS HAVE BEEN ADJUSTED TO THE 1-HR UH

APPENDIX B

THE FLOOD EVENT DATA ARCHIVE

The data used for this study are stored on a computer data base called the Flood Event Data Archive. Data held for each event include flow, catchment average rainfall, raw (collated but not processed) rainfall, antecedent rainfall, soil moisture deficit and text comments. While analysis programmes can access these data directly two standard retrieval options are available to list and plot the data. Examples of these are given in Figures B.1 and B.2. In addition to the event data, information is held that relates directly to catchments. Examples of these are catchment characteristics, digitised data, lists of daily and recording gauges and text comments. The archive contents for a particular catchment are summarised on another standard retrieval as shown in Figure B.3. The lists of daily and recording rainfalls held against each catchment greatly aid the collation of event rainfalls by speeding the interface with peripheral archives containing data from these gauges.

FIGURE B.1

INSTITUTE OF HYDROLOGY   FLOOD EVENT DATA ARCHIVE

CATCHMENT NUMBER [illegible]   EVENT NUMBER 11

NUMBER OF DATA TYPES [illegible]   CODE VALUES [illegible] [illegible] 0 0 11 23122

ANTECEDENT RAINFALL FOR 5 DAYS PRIOR TO EVENT 0. 0. 0.30 11.20 0.

RAINFALL AFTER 9.00 BUT BEFORE START OF EVENT [illegible]
[illegible]

COMMENTS RELATING TO EVENT: RECESSION SMOOTHED AT START
PEAK ESTIMATED BY RIVER AUTHORITY

DATE	TIME	TIME INTO EVENT	FLOW	CATCHMENT AVERAGE RAINFALL	INDIVIDUAL RAINGAUGE PROFILES	
					[illegible]	[illegible]
[illegible]	[illegible]	[illegible]			0.	0.
	10.00	10.00			[illegible]	1.27
	11.00	11.00			[illegible]	[illegible]
	12.00	12.00	[illegible]		0.	0.
	13.00	13.00	[illegible]		0.	0.
	14.00	14.00	[illegible]		0.	0.
	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]		[illegible]	0.
	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]		0.	0.
	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]
	[illegible]	20.00	[illegible]		[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]		[illegible]	0.
	[illegible]	22.00	[illegible]		[illegible]	0.
	[illegible]	23.00	[illegible]		[illegible]	0.
	0.	[illegible]	[illegible]		[illegible]	0.
	1.00	[illegible]	[illegible]		0.	0.
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.76
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.51
	[illegible]	23.00	[illegible]	[illegible]	[illegible]	1.76
	5.00	[illegible]	[illegible]	[illegible]	[illegible]	3.05
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	7.00	31.00	[illegible]	[illegible]	23.[illegible]	1[illegible]
	8.00	32.00	[illegible]	[illegible]	[illegible]	2.29
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	1.20	[illegible]
	17.00	[illegible]	[illegible]	[illegible]	[illegible]	0.
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.78

	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	5.34
	20.00	44.00	87.64	[illegible]	[illegible]	0.25
	21.00	45.00	101.00	[illegible]	7.10	0.
	22.00	46.00	112.25	1.10	3.50	0.
	23.00	47.00	117.55	1.10	1.00	0.
	0.	48.00	[illegible]	[illegible]	[illegible]	0.25
	1.00	49.00	[illegible]	[illegible]	0.	[illegible]
	2.00	50.00	[illegible]	[illegible]	0.	1.02
	3.00	51.00	[illegible]	0.	0.	0.
	4.00	52.00	231.51	[illegible]	0.70	0.
	5.00	53.00	[illegible]	[illegible]	0.40	0.
	6.00	54.00	233.12	[illegible]	0.70	0.
	7.00	55.00	[illegible]	[illegible]	0.20	0.
	8.00	56.00	245.34	0.51	0.	0.51
160965	9.00	57.00	[illegible]	0.	0.	0.
	10.00	58.00	[illegible]	0.	0.	0.
	11.00	59.00	[illegible]	0.	0.	0.
	12.00	60.00	206.31	0.	0.	0.
	13.00	61.00	196.71	0.	0.	0.
	14.00	62.00	[illegible]	0.	0.	0.
	15.00	63.00	177.67	0.	0.	0.
	16.00	64.00	170.37	0.	0.	0.
	17.00	65.00	163.63	0.	0.	0.
	18.00	66.00	157.66	0.	0.	0.
	19.00	67.00	152.21	[illegible]	0.20	0.
	20.00	68.00	147.25	1.50	0.40	0.75
	21.00	69.00	142.73	[illegible]	[illegible]	0.
	22.00	70.00	135.57	0.	0.	0.
	23.00	71.00	134.71	0.30	0.20	0.25
	0.	72.00	131.00	0.	0.	0.
	1.00	73.00	127.61	0.	0.	0.
	2.00	74.00	126.27	[illegible]	0.10	0.
	3.00	75.00	[illegible]	0.	0.	0.
	4.00	76.00	117.60	0.	0.	0.
	5.00	77.00	114.86	0.10	0.10	0.
	[illegible]	[illegible]	[illegible]	[illegible]	0.	[illegible]
	7.00	79.00	107.06	0.30	0.	0.25
	8.00	80.00	[illegible]		0.	0.
170965	9.00	81.00	[illegible]			
	10.00	82.00	[illegible]			
	11.00	83.00	95.06			
	12.00	84.00	92.69			
	13.00	[illegible]	[illegible]			
	14.00	[illegible]	[illegible]			
	15.00	87.00	85.91			
	16.00	88.00	83.54			
	17.00	[illegible]	81.54			
	18.00	[illegible]	[illegible]			
	19.00	91.00	[illegible]			
	20.00	[illegible]	[illegible]			
	21.00	[illegible]	[illegible]			
	22.00	[illegible]	[illegible]			
	23.00	[illegible]	[illegible]			
	0.	[illegible]	[illegible]			
	1.00	[illegible]	[illegible]			
	2.00	[illegible]	[illegible]			
	3.00	[illegible]	[illegible]			
	4.00	[illegible]	[illegible]			
	5.00	[illegible]	[illegible]			
	6.00	[illegible]	63.63			
	[illegible]	[illegible]	[illegible]			
	[illegible]	[illegible]	[illegible]			
[illegible]	9.00	[illegible]	[illegible]			
	10.00	[illegible]	[illegible]			
	11.00	[illegible]	[illegible]			
	12.00	[illegible]	[illegible]			
	13.00	[illegible]	[illegible]			
	14.00	[illegible]	[illegible]			
	15.00	[illegible]	[illegible]			
	[illegible]	[illegible]	[illegible]			

NOTE - RAINFALLS CORRESPOND TO PERIODS [illegible] THIS IS CONTRARY TO MET. OFFICE PRACTICE.

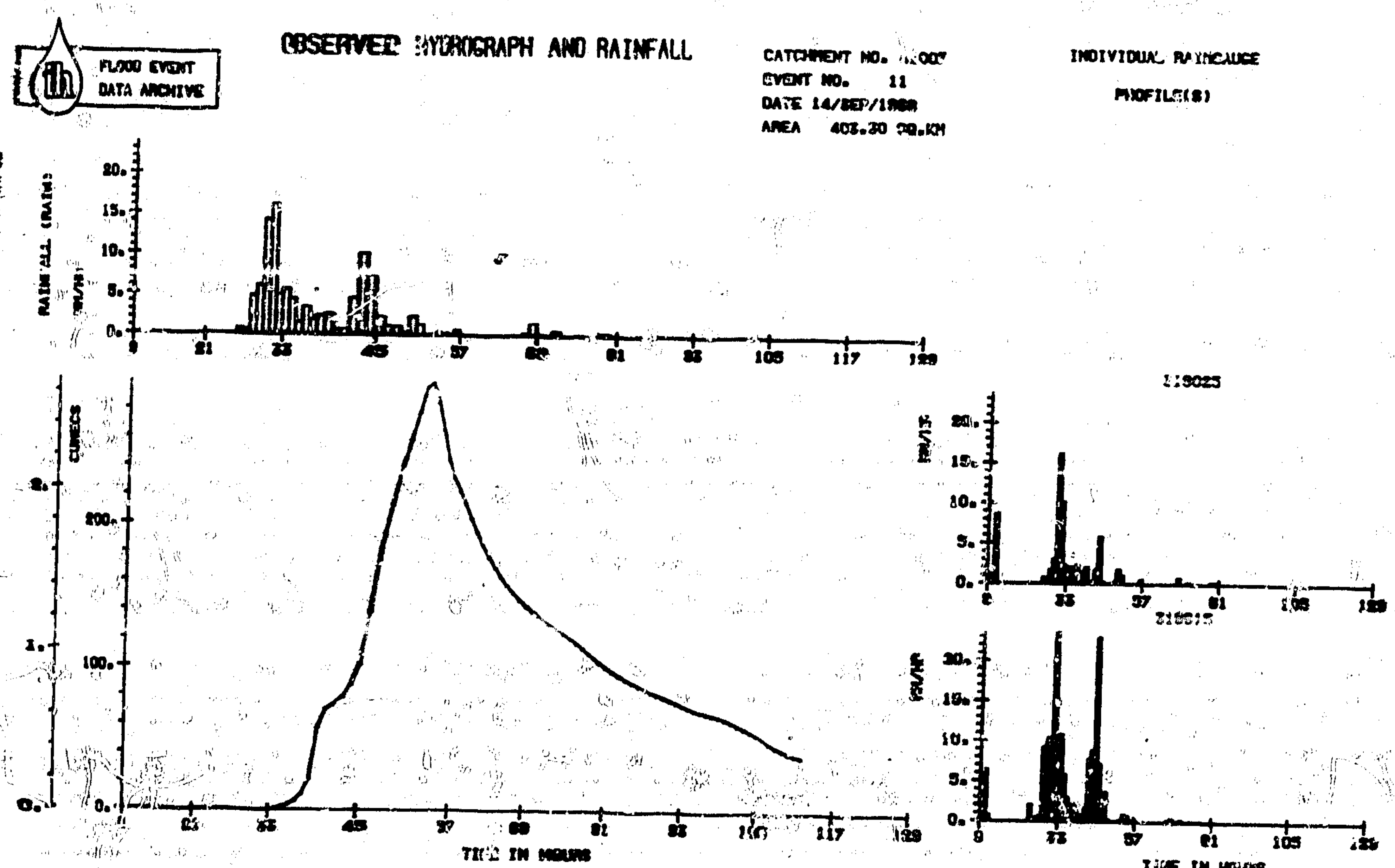
FLOOD EVENT
DATA ARCHIVE
OBSERVED HYDROGRAPH AND RAINFALL
EVENT NO. 11
INDIVIDUAL RAINGAUGE
CATC MENT AVERAGE
FLOW
CUMECS
TIME IN HOURS
TIME IN HOURS

FIGURE D.2

FIGURE B.3

INSTITUTE OF HYDROLOGY FLOOD EVENT DATA ARCHIVE

CATCHMENT NAME [illegible]
CATCHMENT NUMBER 41007
NUMBER OF EVENTS 13

DATES OF FORM SUMMARY INDICATE LATEST ENTRY

CATCHMENT DESCRIPTORS FROM FILE CATCHARS ENTERED 19- 6-84

START OF RECORD	NOT KNOWN	FLOW STATISTICS		RAINFALL INDICIES	
END OF RECORD	CURRENT	AVERAGE DAILY FLOW	CUMECS	ANNUAL AVERAGE RAINFALL	755.0 MM
GRID REF OF GAUGING STATION	5003 1330	MEAN ANNUAL FLOOD (SESMAF)	[illegible] CUMECS	RSMD	31.[illegible] MM
GRID REF OF CATCHMENT CENTROID	5057 1345	MAF FROM ANNUAL MAXIMA	94.9 CUMECS	M5-2D	56.0 MM
CATCHMENT AREA	403.30 SQ KM	TEN YEAR FLOOD (RECORDED)	124.0 CUMECS	EST MAX 2HR RAINFALL	173.0 MM
MAINSTREAM LENGTH	44.77 KM	MAXIMUM RECORDED FLOOD	291.5 CUMECS	EST MAX 24HR RAINFALL	280.0 MM
ACTUAL LENGTH	51.14 KM	YEAR OF BIGGEST FLOOD	1967	JENKINSON R	0.350
ALTITUDE OF STATION	1.0 M	BASE FLOW INDEX		SMDBAR	9.20
ALTITUDE OF WATERSHED	271.0 M	RESPONSE FLOW INDEX			
MAXIMUM ALTITUDE	294.0 M	SOILS		URBAN FRACTION	0.010
USGS SLOPE (S1085)	1.50 M/KM	WRAP SOIL INDEX	0.44	LAKE INDEX	0.06
TAYLOR-SCHWARZ SLOPE	1.45 M/KM	TYPE 1 FRACTION	0.04	STREAM FREQUENCY	1.59 JUNCTIONS/SQ KM
NASH OVERLAND SLOPE	M/KM	TYPE 2 FRACTION	0.	SHAPE FACTOR K	1.223
DRY VALLEY FACTOR	0.013	TYPE 3 FRACTION	0.		
		TYPE 4 FRACTION	0.96		
		TYPE 5 FRACTION	0.		

INNER QUAD USED FOR RAINGAUGE SEARCHES 5035 1105
5275 1295
5155 1443
[illegible]

LIST OF DAILY RAINGAUGES ENTERED 23- 5-83

RAINGAUGE NUMBER	GRID REF EAST	NORTH	PERIOD OF RECORD STARTS	ENDS	ON/OFF CATCHMENT
250957	4879 1325		- 1961	CURRENT	OFF
252529	4840 1350		- 1961	CURRENT	OFF
252265	5076	1397	- 1961	- 1964	OFF
252259	5041	1392	- 1951	CURRENT	OFF
252432	4995	1405	- 1961	- 1966	OFF
252535	5113	1441	- 1951	CURRENT	OFF
311051	5233	1296	- 1971	CURRENT	OFF
314200	5124	1265	- 1959	CURRENT	OFF
314435	5213	1271	- 1975	CURRENT	OFF
310065	5250	1319	- 1962	- 1963	ON
310753	5225	1326	- 1969	CURRENT	ON
310213	5185	1309	- 1969	- 1971	ON
[illegible]	[illegible]	[illegible]	- [illegible]	- [illegible]	ON
[illegible]	[illegible]	[illegible]	- [illegible]	- [illegible]	ON
310232	5162	1304	- 1965	- 1968	ON
310233	5160	1302	- 1961	CURRENT	ON
310239	5174	1387	- 1959	CURRENT	ON
310261	5190	1363	- 1962	CURRENT	ON
310343	5180	1321	- 1977	CURRENT	ON
310347	5176	1321	- 1965	- 1974	ON
310489	5141	1409	- 1963	- 1971	ON
310524	5146	1397	- 1971	CURRENT	ON
310692	5113	1321	- 1959	- 1974	ON
310659	5092	1331	- 1961	- 1965	ON
310503	4942	1361	- 1969	- 1972	ON
310597	4954	1355	- 1963	CURRENT	ON
310920	4975	1350	- 1961	- 1964	ON
310944	5005	1371	- 1969	CURRENT	ON
317013	5014	1342	- 1959	- 1970	ON
317054	5040	1315	- 1959	- 1977	ON
317105	5007	1269	- 1967	CURRENT	ON
317220	4923	1292	- 1951	- 1971	ON
317238	4949	1315	- 1959	- 1975	ON
317241	4927	1295	- 1971	CURRENT	ON
317334	4999	1275	- 1961	- 1962	ON
317459	5015	1270	- 1963	CURRENT	ON
317549	5007	1222	- 1951	- 1959	ON
317556	5059	1227	- 1959	CURRENT	ON
315541	4882	1311	- 1951	- 1962	OFF
315675	4956	1275	- 1959	CURRENT	OFF

LIST OF RECORDING RAINGAUGES ENTERED 23- 5-83

250957	4879	1325	- 1951	CURRENT	OFF
252259	5041	1392	- 1951	CURRENT	OFF
310233	5160	1302	SEP 1956	CURRENT	ON
310343	5180	1321	JUL 1977	CURRENT	ON
310489	5141	1405	APR 1967	FEB 1971	ON
310524	5146	1397	APR 1971	CURRENT	ON

LIST OF EVENT DATA

EVENT NUMBER	ENTRY CODE	QUALITY CODE	FLOW DATA	RAIN DATA	SMD DATA	API DATA	COMMENTS	RAWRAIN DATA	NEW RAIN DAT	NEW API DATA	FS RESULT	EVENT DATE	
1	11	4312355	23- 4-82	21- 4-82	21- 4-82	23- 4-82	23- 4-82	NO ENTRY	NO ENTRY	[illegible]	NO ENTRY	NO DATE	UNSATISFACTORY
2	11	12122	23- 4-82	21- 4-82	21- 4-82	23- 4-82	23- 4-82	NO ENTRY	NO ENTRY	[illegible]	10- 5-82	3 DEC 1960	GOOD
3	11	52121	23- 4-82	21- 4-82	21- 4-82	23- 4-82	23- 4-82	NO ENTRY	NO ENTRY	NO ENTRY	10- 5-82	27 JAN 1961	SNOW
4	11	11121	23- 4-82	21- 4-82	21- 4-82	23- 4-82	23- 4-82	NO ENTRY	NO ENTRY	NO ENTRY	10- 5-82	27 FEB 1961	GOOD
5	11	11122	23- 4-82	21- 4-82	21- 4-82	23- 4-82	23- 4-82	NO ENTRY	NO ENTRY	NO ENTRY	10- 5-82	3 MAY 1961	GOOD
6	11	11121	23- 4-82	21- 4-82	21- 4-82	23- 4-82	23- [illegible]-82	11- 5-82	NO ENTRY	NO ENTRY	10- 5-82	16 NOV 1963	GOOD
7	11	11122	23- 4-82	21- 4-82	21- 4-82	23- 4-82	23- 4-82	NO ENTRY	NO ENTRY	NO ENTRY	10- 5-82	13 MAR 1964	GOOD
8	11	21122	23- 4-82	21- 4-82	21- 4-82	23- 4-82	23- 4-82	NO ENTRY	NO ENTRY	NO ENTRY	10- 5-82	31 MAY 1964	VARIABLE RAIN
9	11	11122	23- 4-82	21- 4-82	21- 4-82	23- 4-82	23- 4-82	NO ENTRY	NO ENTRY	NO ENTRY	10- 5-82	28 NOV 1965	GOOD
10	11	11121	23- 4-82	21- 4-82	21- 4-82	23- 4-82	NO ENTRY	NO ENTRY	NO ENTRY	NO ENTRY	10- 5-82	22 OCT 1966	GOOD
11	11	23122	23- 4-82	21- 4-82	21- 4-82	23- 4-82	23- 4-82	11- 5-82	NO ENTRY	NO ENTRY	10- 5-82	14 SEP 1968	VARIABLE RAIN
12	11	21121	23- 4-82	21- 4-82	21- 4-82	23- 4-82	23- 4-82	NO ENTRY	NO ENTRY	NO ENTRY	10- 5-82	15 DEC 1968	VARIABLE RAIN
13	11	23122	23- 4-82	21- 4-82	21- 4-82	23- 4-82	23- 4-82	NO ENTRY	NO ENTRY	NO ENTRY	10- 5-82	11 MAR 1969	VARIABLE RAIN

EVENT BREAKDOWN :-

NO ENTRY	0
GOOD	7
VARIABLE RAIN	4
UNINTERESTING	0
UNSATISFACTORY	1
SNOW	1

APPENDIX C

A LOCALISED REINTERPRETATION OF THE WRAP MAP

During the preliminary analysis of the percentage runoff data a group of catchments stood out as having very much larger percentage runoffs than would be expected from their SOIL classification. One catchment, located entirely on type 1 soil was giving percentage runoffs well over 50% (the highest being 75%). The catchments all fell partly or wholly on a single soil association. While this soil is correctly classed as type 1 by the scheme given in FSR I.4.2.3 (see also Farquharson et al, 1978), there is evidence from the current study and elsewhere (Gustard, 1981) that its hydrological response is as expected from a type 5 soil. Table C.1 lists the nine catchments occurring on this soil association and gives two measures of their hydrological response; percentage runoff and base flow index. Reinterpreting this soil as type 5 gives a consistent improvement across all the catchments and so it is recommended that the soil map should be amended accordingly. Figure C.1 shows the newly interpreted WRAP map for this area.

TABLE C.1 PERCENTAGE RUNOFF, BFI AND SOIL VALUES FOR ANOMALOUS CATCHMENTS

Catchment	Percentage Runoff	BFI	Soil type 1 (FSR)	SPR from SOIL (FSR)	SPR from soils (now)
76014	30-80	0.25	0.51	29.9	52.0
71802	60-80	0.26	0.09	45.8	53.0
72006	50-80	-	0.21	40.7	53.0
76805	50-70	0.27	1.00	15.0	53.0
27034	50-70	0.34	0.03	45.4	49.8
27027	30-90	0.38	0.16	40.1	52.7
76005	65	0.39	0.48	30.3	51.2
27035	23-50	0.43	0.12	41.5	49.8
73008	20-50	0.50	0.08	27.5	31.8

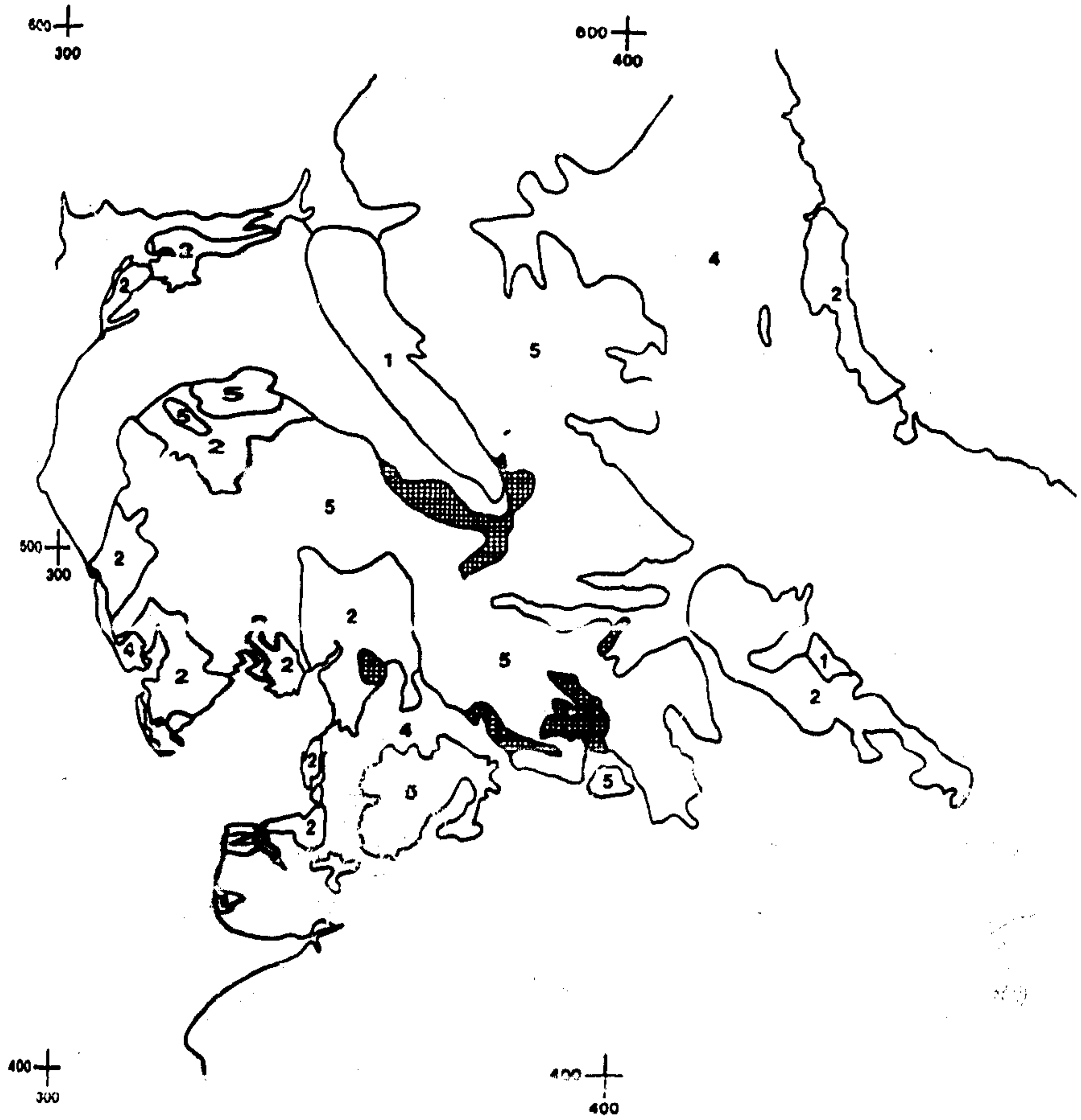

FIGURE C.1 Areas of Soil 1 reinterpreted as Soil 5

It is important to appreciate that such an interpretation of the WRAP map requires careful consideration of the distribution of the soil association under examination, and the veracity and extent of relevant hydrological data. Users of the estimation procedures are advised against making such a reassessment themselves but should use local data to refine FSR estimates as described in Section 4.

References

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